

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: P868872

Luminaire Tested: **EMM2-HSN-SA1A-727-U-T2U**

Issue Date: 08/22/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P868872  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/22/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: EMM2-HSN-SA1A-727-U-T2U  
Description: EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 40W 70CRI 2700K  
FITXURE w/ TYPE II URBAN DISTRIBUTION OPTIC  
Light Source: (10) 2700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

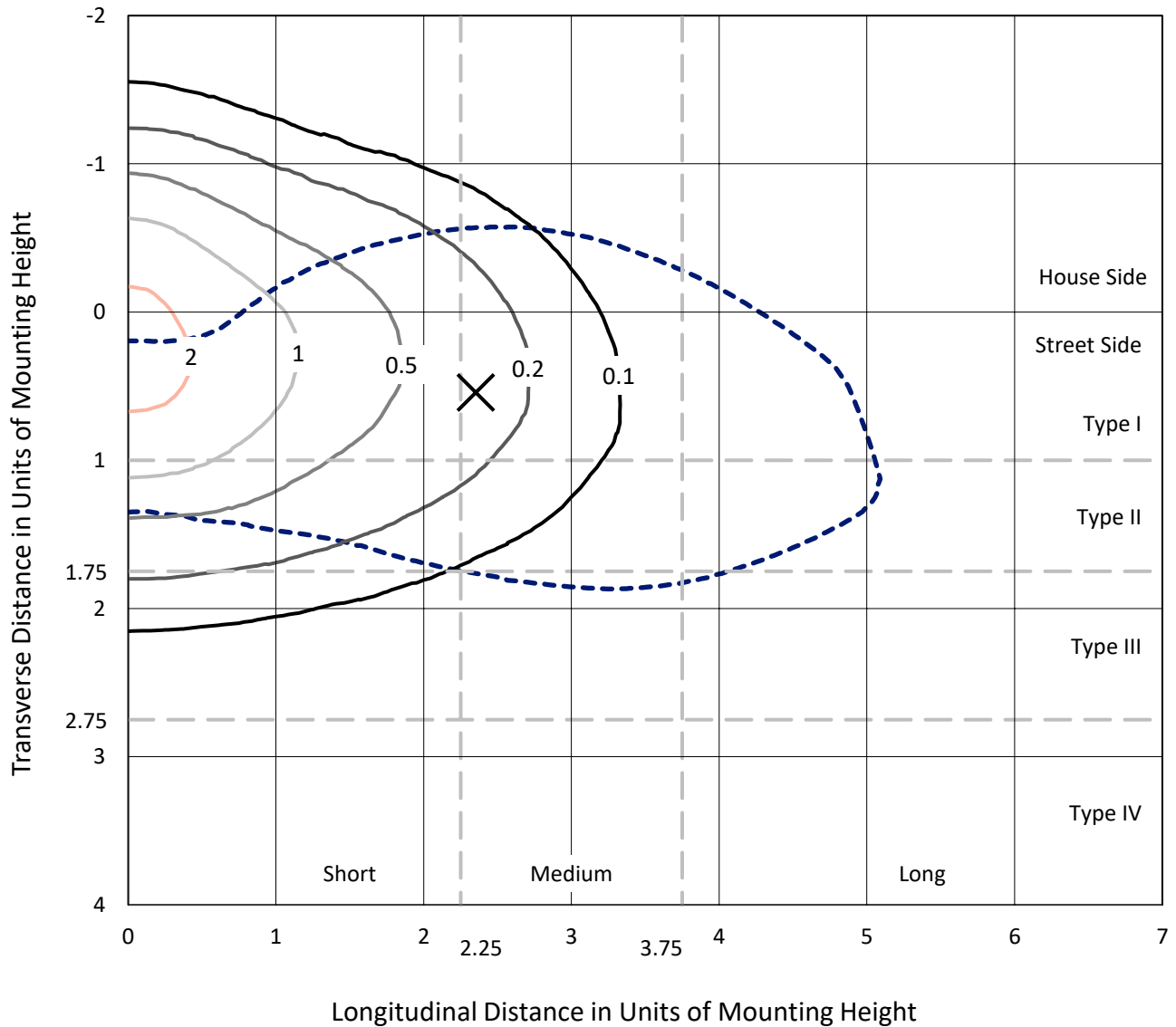
Lumens per Lamp: N/A  
Luminaire Lumens: 4611.2 lumens  
Efficiency: N/A  
Efficacy: 140.6 lumens/watt  
Luminous Opening: Rectangular (W 0.33' x L: 0.33' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B1 - U0 - G1

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

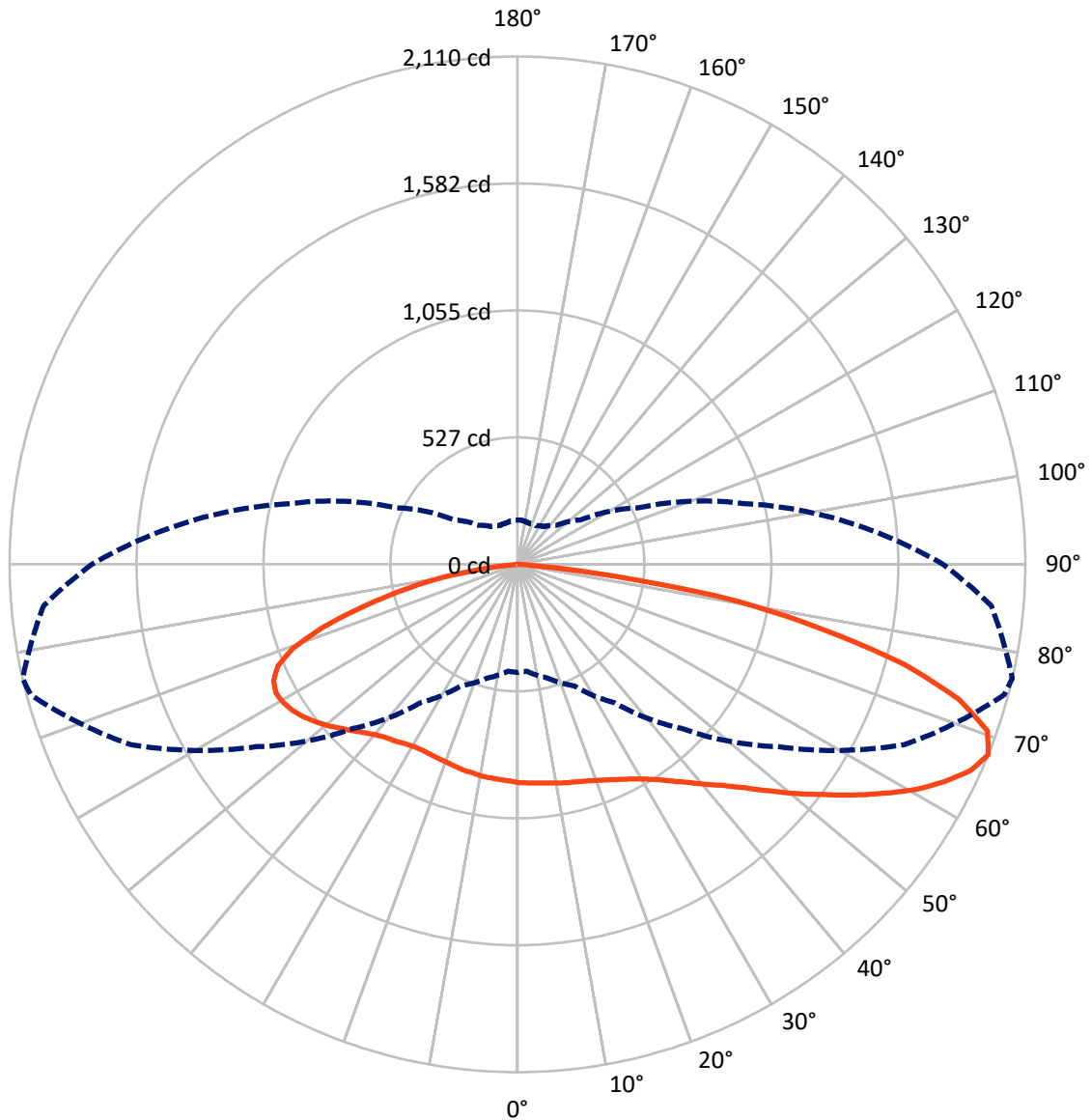
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 2.5 fc  
 Type III - Medium - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 77-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1533.4   | 0.0    | 1533.4 |
|                    | % Fixture | 33.3     | 0.0    | 33.3   |
| <b>Street Side</b> | Lumens    | 3077.8   | 0.0    | 3077.8 |
|                    | % Fixture | 66.7     | 0.0    | 66.7   |
| <b>Total</b>       | Lumens    | 4611.2   | 0.0    | 4611.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 87.1   | 1.9       |
| 10°-20°   | 264.3  | 5.7       |
| 20°-30°   | 445.5  | 9.7       |
| 30°-40°   | 632.2  | 13.7      |
| 40°-50°   | 799.9  | 17.3      |
| 50°-60°   | 876.3  | 19.0      |
| 60°-70°   | 847.1  | 18.4      |
| 70°-80°   | 569.7  | 12.4      |
| 80°-90°   | 89.0   | 1.9       |
| 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°    | 4611.2 | 100.0     |
| 0°-180°   | 4611.2 | 100.0     |

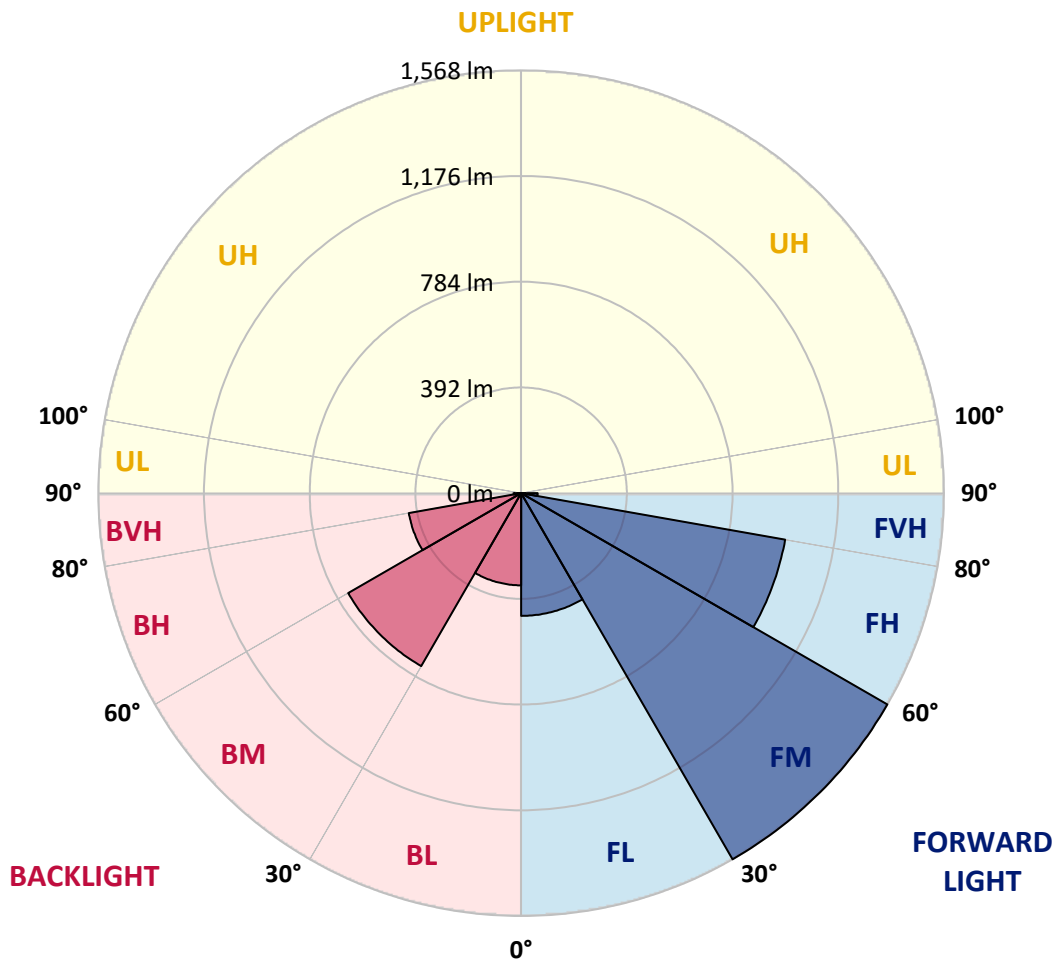


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 455.1  | 9.9       |                         |      |         |
| FM   | (30°-60°)   | 1567.9 | 34.0      |                         |      |         |
| FH   | (60°-80°)   | 993.9  | 21.6      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 61.0   | 1.3       |                         |      | G1/100  |
| BL   | (0°-30°)    | 341.8  | 7.4       | B1/500                  |      |         |
| BM   | (30°-60°)   | 740.6  | 16.1      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 422.9  | 9.2       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 28.1   | 0.6       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**  
 Type III Medium





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CATALOG NUMBER: EMM2-HSN-SA1A-727-U-T2U

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 77°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 906.6  | 906.6  | 906.6  | 906.6  | 906.6  | 906.6  | 906.6  | 906.6  | 906.6  | 906.6  | 906.6  |
| 2.5°  | 926.7  | 925.8  | 921.2  | 923.0  | 917.6  | 921.2  | 915.7  | 911.2  | 910.3  | 909.3  | 910.3  |
| 5°    | 955.9  | 951.3  | 946.7  | 944.0  | 939.4  | 937.6  | 928.5  | 919.4  | 913.9  | 913.0  | 911.2  |
| 7.5°  | 989.6  | 987.8  | 981.4  | 977.7  | 965.0  | 958.6  | 945.8  | 929.4  | 921.2  | 917.6  | 913.0  |
| 10°   | 1024.3 | 1028.8 | 1020.6 | 1013.3 | 998.7  | 985.0  | 963.2  | 942.2  | 925.8  | 923.9  | 913.9  |
| 12.5° | 1067.1 | 1066.2 | 1060.7 | 1048.0 | 1030.6 | 1011.5 | 985.0  | 955.9  | 934.0  | 930.3  | 915.7  |
| 15°   | 1105.4 | 1104.5 | 1097.2 | 1085.4 | 1062.6 | 1038.9 | 1003.3 | 969.5  | 942.2  | 936.7  | 919.4  |
| 17.5° | 1141.0 | 1139.2 | 1134.6 | 1121.9 | 1093.6 | 1064.4 | 1029.7 | 985.0  | 952.2  | 945.8  | 922.1  |
| 20°   | 1172.0 | 1173.8 | 1168.4 | 1155.6 | 1129.2 | 1098.1 | 1054.4 | 1005.1 | 965.0  | 957.7  | 930.3  |
| 22.5° | 1205.8 | 1206.7 | 1203.9 | 1199.4 | 1165.6 | 1132.8 | 1085.4 | 1027.9 | 979.6  | 972.3  | 939.4  |
| 25°   | 1241.3 | 1242.3 | 1244.1 | 1241.3 | 1203.0 | 1167.5 | 1117.3 | 1056.2 | 999.6  | 989.6  | 952.2  |
| 27.5° | 1282.4 | 1283.3 | 1286.9 | 1281.5 | 1240.4 | 1203.0 | 1152.9 | 1086.3 | 1020.6 | 1009.7 | 963.2  |
| 30°   | 1328.9 | 1332.5 | 1329.8 | 1328.0 | 1280.6 | 1244.1 | 1188.4 | 1117.3 | 1048.0 | 1034.3 | 982.3  |
| 32.5° | 1384.5 | 1383.6 | 1378.2 | 1372.7 | 1324.3 | 1286.0 | 1228.6 | 1157.4 | 1081.7 | 1066.2 | 1013.3 |
| 35°   | 1424.7 | 1424.7 | 1416.5 | 1413.7 | 1369.0 | 1328.9 | 1272.3 | 1202.1 | 1120.0 | 1105.4 | 1046.2 |
| 37.5° | 1449.3 | 1452.9 | 1446.6 | 1448.4 | 1405.5 | 1368.1 | 1316.1 | 1247.7 | 1162.0 | 1149.2 | 1086.3 |
| 40°   | 1458.4 | 1467.5 | 1473.0 | 1480.3 | 1437.4 | 1405.5 | 1362.6 | 1297.0 | 1215.8 | 1201.2 | 1134.6 |
| 42.5° | 1460.2 | 1473.9 | 1493.1 | 1508.6 | 1460.2 | 1433.8 | 1407.3 | 1347.1 | 1268.7 | 1255.9 | 1187.5 |
| 45°   | 1451.1 | 1444.7 | 1491.2 | 1493.1 | 1473.0 | 1456.6 | 1446.6 | 1407.3 | 1345.3 | 1324.3 | 1253.2 |
| 47.5° | 1381.8 | 1374.5 | 1387.3 | 1445.6 | 1457.5 | 1466.6 | 1486.7 | 1477.6 | 1421.9 | 1405.5 | 1328.9 |
| 50°   | 1269.6 | 1266.0 | 1317.0 | 1380.0 | 1419.2 | 1465.7 | 1519.5 | 1545.1 | 1506.8 | 1496.7 | 1424.7 |
| 52.5° | 1084.5 | 1074.4 | 1178.4 | 1300.6 | 1369.0 | 1456.6 | 1542.3 | 1614.4 | 1602.5 | 1587.9 | 1506.8 |
| 55°   | 966.8  | 966.8  | 1037.0 | 1189.4 | 1305.2 | 1423.8 | 1556.9 | 1687.3 | 1708.3 | 1691.9 | 1600.7 |
| 57.5° | 840.9  | 851.0  | 923.9  | 1028.8 | 1213.1 | 1363.6 | 1555.1 | 1748.5 | 1810.5 | 1795.0 | 1700.1 |
| 60°   | 733.3  | 741.5  | 783.5  | 889.3  | 1104.5 | 1284.2 | 1535.0 | 1798.6 | 1905.3 | 1899.9 | 1787.7 |
| 62.5° | 623.9  | 633.9  | 667.6  | 767.1  | 961.3  | 1193.0 | 1493.1 | 1826.0 | 1994.7 | 1989.2 | 1876.1 |
| 65°   | 536.3  | 537.2  | 571.0  | 654.0  | 818.1  | 1082.6 | 1419.2 | 1820.5 | 2064.0 | 2067.7 | 1950.9 |
| 67.5° | 448.7  | 446.0  | 489.8  | 557.3  | 701.4  | 964.1  | 1320.7 | 1772.2 | 2093.2 | 2109.6 | 1975.6 |
| 70°   | 330.2  | 333.8  | 394.9  | 469.7  | 592.9  | 827.3  | 1183.0 | 1678.2 | 2045.8 | 2071.3 | 1919.0 |
| 72.5° | 248.1  | 255.4  | 314.7  | 392.2  | 495.3  | 690.4  | 1032.5 | 1515.0 | 1913.5 | 1917.2 | 1746.6 |
| 75°   | 201.6  | 203.4  | 256.3  | 325.6  | 405.9  | 553.6  | 829.1  | 1265.1 | 1618.0 | 1660.0 | 1484.0 |
| 77.5° | 171.5  | 169.6  | 195.2  | 262.7  | 327.4  | 442.4  | 624.8  | 962.2  | 1270.5 | 1289.7 | 1162.0 |
| 80°   | 145.9  | 145.0  | 154.1  | 212.5  | 256.3  | 315.6  | 427.8  | 670.4  | 906.6  | 927.6  | 825.4  |
| 82.5° | 76.6   | 82.1   | 80.3   | 131.3  | 145.0  | 166.0  | 205.2  | 304.6  | 395.8  | 401.3  | 379.4  |
| 85°   | 3.6    | 3.6    | 3.6    | 5.5    | 9.1    | 14.6   | 28.3   | 28.3   | 31.0   | 59.3   | 67.5   |
| 87.5° | 0.9    | 0.9    | 1.8    | 1.8    | 1.8    | 2.7    | 2.7    | 3.6    | 3.6    | 3.6    | 3.6    |
| 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: P868872

CATALOG NUMBER: EMM2-HSN-SA1A-727-U-T2U

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 906.6  | 906.6  | 906.6  | 906.6 | 906.6 | 906.6 | 906.6 | 906.6 | 906.6 | 906.6 | 906.6 |
| 2.5°  | 908.4  | 904.8  | 899.3  | 900.2 | 899.3 | 899.3 | 894.7 | 891.1 | 890.2 | 892.0 | 895.7 |
| 5°    | 909.3  | 903.9  | 895.7  | 892.9 | 890.2 | 888.4 | 881.1 | 875.6 | 872.9 | 874.7 | 875.6 |
| 7.5°  | 909.3  | 901.1  | 892.0  | 886.5 | 879.2 | 873.8 | 865.6 | 858.3 | 854.6 | 855.5 | 857.4 |
| 10°   | 907.5  | 898.4  | 891.1  | 880.2 | 868.3 | 861.9 | 849.1 | 840.0 | 835.5 | 836.4 | 831.8 |
| 12.5° | 907.5  | 897.5  | 882.9  | 872.9 | 856.4 | 842.8 | 832.7 | 822.7 | 819.0 | 815.4 | 813.6 |
| 15°   | 908.4  | 895.7  | 881.1  | 860.1 | 840.9 | 826.3 | 813.6 | 807.2 | 801.7 | 799.9 | 800.8 |
| 17.5° | 908.4  | 895.7  | 873.8  | 849.1 | 827.3 | 809.0 | 798.1 | 790.8 | 788.9 | 787.1 | 787.1 |
| 20°   | 913.0  | 896.6  | 867.4  | 838.2 | 810.8 | 791.7 | 781.7 | 777.1 | 777.1 | 774.4 | 774.4 |
| 22.5° | 920.3  | 898.4  | 863.7  | 829.1 | 797.2 | 776.2 | 765.2 | 759.8 | 762.5 | 760.7 | 759.8 |
| 25°   | 928.5  | 904.8  | 859.2  | 816.3 | 778.9 | 757.0 | 746.1 | 742.4 | 741.5 | 737.0 | 743.3 |
| 27.5° | 934.9  | 909.3  | 856.4  | 803.5 | 762.5 | 737.0 | 723.3 | 716.9 | 712.3 | 714.2 | 712.3 |
| 30°   | 952.2  | 922.1  | 857.4  | 792.6 | 744.3 | 713.2 | 696.8 | 689.5 | 687.7 | 687.7 | 687.7 |
| 32.5° | 975.9  | 938.5  | 863.7  | 788.0 | 726.9 | 690.4 | 670.4 | 663.1 | 661.3 | 657.6 | 659.4 |
| 35°   | 1006.0 | 963.2  | 873.8  | 780.7 | 713.2 | 664.0 | 642.1 | 632.1 | 629.3 | 625.7 | 625.7 |
| 37.5° | 1039.8 | 987.8  | 881.1  | 777.1 | 695.0 | 636.6 | 612.0 | 599.2 | 597.4 | 593.8 | 595.6 |
| 40°   | 1082.6 | 1021.5 | 892.9  | 769.8 | 674.0 | 612.0 | 579.2 | 558.2 | 562.8 | 564.6 | 568.2 |
| 42.5° | 1131.0 | 1064.4 | 911.2  | 762.5 | 657.6 | 586.5 | 538.1 | 517.1 | 522.6 | 520.8 | 524.4 |
| 45°   | 1196.6 | 1114.6 | 934.0  | 759.8 | 637.5 | 555.5 | 496.2 | 472.5 | 470.6 | 467.9 | 469.7 |
| 47.5° | 1265.1 | 1174.8 | 955.9  | 754.3 | 615.7 | 517.1 | 448.7 | 418.6 | 411.3 | 407.7 | 404.1 |
| 50°   | 1336.2 | 1235.0 | 981.4  | 750.6 | 586.5 | 474.3 | 401.3 | 366.7 | 353.0 | 348.4 | 343.9 |
| 52.5° | 1416.5 | 1299.7 | 1003.3 | 741.5 | 554.5 | 429.6 | 358.4 | 319.2 | 303.7 | 294.6 | 295.5 |
| 55°   | 1501.3 | 1359.0 | 1023.4 | 730.6 | 518.1 | 387.6 | 315.6 | 282.7 | 267.2 | 264.5 | 264.5 |
| 57.5° | 1579.7 | 1420.1 | 1037.9 | 711.4 | 481.6 | 346.6 | 280.0 | 251.7 | 244.4 | 248.1 | 248.1 |
| 60°   | 1660.0 | 1469.4 | 1045.2 | 690.4 | 444.2 | 311.9 | 255.4 | 232.6 | 228.9 | 236.2 | 237.1 |
| 62.5° | 1724.7 | 1508.6 | 1043.4 | 661.3 | 403.1 | 281.8 | 231.7 | 213.4 | 215.3 | 228.0 | 230.8 |
| 65°   | 1771.3 | 1527.7 | 1020.6 | 617.5 | 363.9 | 255.4 | 210.7 | 193.4 | 193.4 | 202.5 | 205.2 |
| 67.5° | 1767.6 | 1503.1 | 975.0  | 556.4 | 322.0 | 228.9 | 191.5 | 177.9 | 177.9 | 184.2 | 183.3 |
| 70°   | 1692.8 | 1418.3 | 888.4  | 482.5 | 280.9 | 206.1 | 175.1 | 165.1 | 164.2 | 166.9 | 166.0 |
| 72.5° | 1513.1 | 1245.9 | 753.4  | 398.6 | 242.6 | 183.3 | 158.7 | 149.6 | 147.8 | 144.1 | 141.4 |
| 75°   | 1248.6 | 1023.4 | 588.3  | 317.4 | 205.2 | 161.4 | 143.2 | 135.0 | 127.7 | 132.3 | 129.5 |
| 77.5° | 968.6  | 785.3  | 437.8  | 246.3 | 166.9 | 140.5 | 127.7 | 118.6 | 116.7 | 133.2 | 127.7 |
| 80°   | 706.9  | 542.7  | 309.2  | 176.0 | 129.5 | 114.0 | 106.7 | 99.4  | 125.9 | 168.7 | 167.8 |
| 82.5° | 313.8  | 261.8  | 141.4  | 83.9  | 60.2  | 50.2  | 42.0  | 47.4  | 79.4  | 77.5  | 80.3  |
| 85°   | 28.3   | 29.2   | 15.5   | 10.0  | 6.4   | 5.5   | 3.6   | 3.6   | 2.7   | 2.7   | 2.7   |
| 87.5° | 3.6    | 3.6    | 2.7    | 2.7   | 1.8   | 1.8   | 1.8   | 1.8   | 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: SP1-2407-157-3

Test Date: 08/07/2024

Luminaire Tested: MEM2-HTN-SA-40-727-U-5WQ-2

Data in this report applies to families of products including MEM2-HTN-SA-40-727-U-5WQ-2

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/20/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Streetworks  
 Catalog Number: **MEM2-HTN-SA-40-727-U-5WQ-2**  
 Description: Epic Modern Light Square 40W 5WQ Optic and Flare Trim

**Spectral Parameters**

CCT (K): 2747  
 CIE u': 0.2606  
 CIE v': 0.5257  
 Duv: -0.0005  
 CIE x: 0.4552  
 CIE y: 0.4082  
 CIE z: 0.1366  
 Peak Wavelength (nm): 597  
 Dominant Wavelength (nm): 584  
 Purity: 59.16856  
 Rf: 75.5  
 Rg: 93.6

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.7 |      |       |
| R1:       | 68.1 | R9:  | -35.3 |
| R2:       | 83.9 | R10: | 64.2  |
| R3:       | 94.7 | R11: | 61.7  |
| R4:       | 66.3 | R12: | 53.9  |
| R5:       | 67.4 | R13: | 71.2  |
| R6:       | 78.7 | R14: | 97.6  |
| R7:       | 75.0 | R15: | 59.3  |
| R8:       | 39.4 |      |       |



**Test Conditions**

Stabilization Time: 22M  
 Operation Time: 1H 22M  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2407-157-3

| 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: SP1-2407-157-3

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 2700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**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            | 103                      | NR                   | 620            | 846                      | NR                   | 750            | 20                       | NR                   | 880            | 0                        | NR                   |
| 365            | 0                        | NR                   | 495            | 130                      | NR                   | 625            | 784                      | NR                   | 755            | 17                       | NR                   | 885            | 1                        | NR                   |
| 370            | 0                        | NR                   | 500            | 171                      | NR                   | 630            | 720                      | NR                   | 760            | 15                       | NR                   | 890            | 0                        | NR                   |
| 375            | 0                        | NR                   | 505            | 221                      | NR                   | 635            | 652                      | NR                   | 765            | 13                       | NR                   | 895            | 0                        | NR                   |
| 380            | 0                        | NR                   | 510            | 268                      | NR                   | 640            | 587                      | NR                   | 770            | 11                       | NR                   | 900            | 0                        | NR                   |
| 385            | 0                        | NR                   | 515            | 313                      | NR                   | 645            | 521                      | NR                   | 775            | 9                        | NR                   | 905            | 0                        | NR                   |
| 390            | 0                        | NR                   | 520            | 350                      | NR                   | 650            | 461                      | NR                   | 780            | 8                        | NR                   | 910            | 0                        | NR                   |
| 395            | 0                        | NR                   | 525            | 381                      | NR                   | 655            | 406                      | NR                   | 785            | 7                        | NR                   | 915            | 0                        | NR                   |
| 400            | 0                        | NR                   | 530            | 407                      | NR                   | 660            | 353                      | NR                   | 790            | 6                        | NR                   | 920            | 0                        | NR                   |
| 405            | 2                        | NR                   | 535            | 435                      | NR                   | 665            | 307                      | NR                   | 795            | 5                        | NR                   | 925            | 0                        | NR                   |
| 410            | 4                        | NR                   | 540            | 462                      | NR                   | 670            | 264                      | NR                   | 800            | 4                        | NR                   | 930            | 0                        | NR                   |
| 415            | 9                        | NR                   | 545            | 496                      | NR                   | 675            | 227                      | NR                   | 805            | 4                        | NR                   | 935            | 0                        | NR                   |
| 420            | 20                       | NR                   | 550            | 534                      | NR                   | 680            | 196                      | NR                   | 810            | 3                        | NR                   | 940            | 0                        | NR                   |
| 425            | 38                       | NR                   | 555            | 582                      | NR                   | 685            | 167                      | NR                   | 815            | 3                        | NR                   | 945            | 0                        | NR                   |
| 430            | 69                       | NR                   | 560            | 638                      | NR                   | 690            | 144                      | NR                   | 820            | 2                        | NR                   | 950            | 0                        | NR                   |
| 435            | 120                      | NR                   | 565            | 700                      | NR                   | 695            | 122                      | NR                   | 825            | 2                        | NR                   | 955            | 0                        | NR                   |
| 440            | 193                      | NR                   | 570            | 767                      | NR                   | 700            | 103                      | NR                   | 830            | 2                        | NR                   | 960            | 0                        | NR                   |
| 445            | 316                      | NR                   | 575            | 836                      | NR                   | 705            | 88                       | NR                   | 835            | 2                        | NR                   | 965            | 0                        | NR                   |
| 450            | 469                      | NR                   | 580            | 898                      | NR                   | 710            | 74                       | NR                   | 840            | 1                        | NR                   | 970            | 0                        | NR                   |
| 455            | 431                      | NR                   | 585            | 947                      | NR                   | 715            | 63                       | NR                   | 845            | 1                        | NR                   | 975            | 0                        | NR                   |
| 460            | 264                      | NR                   | 590            | 982                      | NR                   | 720            | 54                       | NR                   | 850            | 1                        | NR                   | 980            | 0                        | NR                   |
| 465            | 197                      | NR                   | 595            | 997                      | NR                   | 725            | 46                       | NR                   | 855            | 1                        | NR                   | 985            | 0                        | NR                   |
| 470            | 155                      | NR                   | 600            | 997                      | NR                   | 730            | 39                       | NR                   | 860            | 1                        | NR                   | 990            | 0                        | NR                   |
| 475            | 108                      | NR                   | 605            | 978                      | NR                   | 735            | 33                       | NR                   | 865            | 1                        | NR                   | 995            | 0                        | NR                   |
| 480            | 90                       | NR                   | 610            | 947                      | NR                   | 740            | 28                       | NR                   | 870            | 1                        | NR                   | 1000           | 0                        | NR                   |
| 485            | 92                       | NR                   | 615            | 900                      | NR                   | 745            | 24                       | NR                   | 875            | 1                        | NR                   |                |                          |                      |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.13**

| 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    | 103                      | NR            | 620    | 846                      | NR            | 750    | 20                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 130                      | NR            | 625    | 784                      | NR            | 755    | 17                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 171                      | NR            | 630    | 720                      | NR            | 760    | 15                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 221                      | NR            | 635    | 652                      | NR            | 765    | 13                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 268                      | NR            | 640    | 587                      | NR            | 770    | 11                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 313                      | NR            | 645    | 521                      | NR            | 775    | 9                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 350                      | NR            | 650    | 461                      | NR            | 780    | 8                        | NR            | 910    | 0                        | NR            |
| 395    | 0                        | NR            | 525    | 381                      | NR            | 655    | 406                      | NR            | 785    | 7                        | NR            | 915    | 0                        | NR            |
| 400    | 0                        | NR            | 530    | 407                      | NR            | 660    | 353                      | NR            | 790    | 6                        | NR            | 920    | 0                        | NR            |
| 405    | 2                        | NR            | 535    | 435                      | NR            | 665    | 307                      | NR            | 795    | 5                        | NR            | 925    | 0                        | NR            |
| 410    | 4                        | NR            | 540    | 462                      | NR            | 670    | 264                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 9                        | NR            | 545    | 496                      | NR            | 675    | 227                      | NR            | 805    | 4                        | NR            | 935    | 0                        | NR            |
| 420    | 20                       | NR            | 550    | 534                      | NR            | 680    | 196                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 38                       | NR            | 555    | 582                      | NR            | 685    | 167                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 69                       | NR            | 560    | 638                      | NR            | 690    | 144                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 120                      | NR            | 565    | 700                      | NR            | 695    | 122                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 193                      | NR            | 570    | 767                      | NR            | 700    | 103                      | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 316                      | NR            | 575    | 836                      | NR            | 705    | 88                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 469                      | NR            | 580    | 898                      | NR            | 710    | 74                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 431                      | NR            | 585    | 947                      | NR            | 715    | 63                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 264                      | NR            | 590    | 982                      | NR            | 720    | 54                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 197                      | NR            | 595    | 997                      | NR            | 725    | 46                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 155                      | NR            | 600    | 997                      | NR            | 730    | 39                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 108                      | NR            | 605    | 978                      | NR            | 735    | 33                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 90                       | NR            | 610    | 947                      | NR            | 740    | 28                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 92                       | NR            | 615    | 900                      | NR            | 745    | 24                       | NR            | 875    | 1                        | NR            |        |                          |               |

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Melanopic Flux vs. Wavelength



Melanopic Lumens: NR M/P: 2.04

| 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    | 103                      | NR            | 620    | 846                      | NR            | 750    | 20                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 130                      | NR            | 625    | 784                      | NR            | 755    | 17                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 171                      | NR            | 630    | 720                      | NR            | 760    | 15                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 221                      | NR            | 635    | 652                      | NR            | 765    | 13                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 268                      | NR            | 640    | 587                      | NR            | 770    | 11                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 313                      | NR            | 645    | 521                      | NR            | 775    | 9                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 350                      | NR            | 650    | 461                      | NR            | 780    | 8                        | NR            | 910    | 0                        | NR            |
| 395    | 0                        | NR            | 525    | 381                      | NR            | 655    | 406                      | NR            | 785    | 7                        | NR            | 915    | 0                        | NR            |
| 400    | 0                        | NR            | 530    | 407                      | NR            | 660    | 353                      | NR            | 790    | 6                        | NR            | 920    | 0                        | NR            |
| 405    | 2                        | NR            | 535    | 435                      | NR            | 665    | 307                      | NR            | 795    | 5                        | NR            | 925    | 0                        | NR            |
| 410    | 4                        | NR            | 540    | 462                      | NR            | 670    | 264                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 9                        | NR            | 545    | 496                      | NR            | 675    | 227                      | NR            | 805    | 4                        | NR            | 935    | 0                        | NR            |
| 420    | 20                       | NR            | 550    | 534                      | NR            | 680    | 196                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 38                       | NR            | 555    | 582                      | NR            | 685    | 167                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 69                       | NR            | 560    | 638                      | NR            | 690    | 144                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 120                      | NR            | 565    | 700                      | NR            | 695    | 122                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 193                      | NR            | 570    | 767                      | NR            | 700    | 103                      | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 316                      | NR            | 575    | 836                      | NR            | 705    | 88                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 469                      | NR            | 580    | 898                      | NR            | 710    | 74                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 431                      | NR            | 585    | 947                      | NR            | 715    | 63                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 264                      | NR            | 590    | 982                      | NR            | 720    | 54                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 197                      | NR            | 595    | 997                      | NR            | 725    | 46                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 155                      | NR            | 600    | 997                      | NR            | 730    | 39                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 108                      | NR            | 605    | 978                      | NR            | 735    | 33                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 90                       | NR            | 610    | 947                      | NR            | 740    | 28                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 92                       | NR            | 615    | 900                      | NR            | 745    | 24                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 75.5$   
 $R_g = 93.6$   
 $CIE R_a = 71.7$   
 $R_g = -35.3$



**Color Vector Graphics**





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

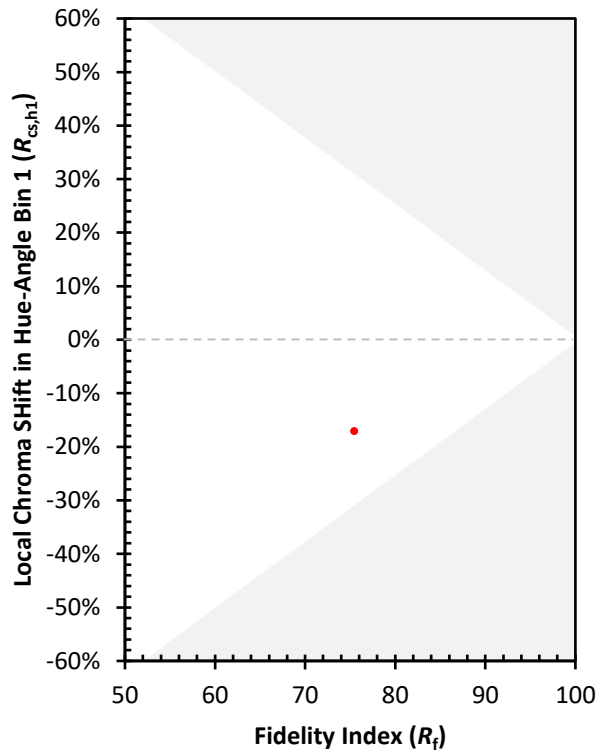
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 68 | CES51 = 87 | CES76 = 63 |
| CES02 = 63 | CES27 = 90 | CES52 = 85 | CES77 = 79 |
| CES03 = 31 | CES28 = 87 | CES53 = 78 | CES78 = 66 |
| CES04 = 71 | CES29 = 71 | CES54 = 86 | CES79 = 87 |
| CES05 = 50 | CES30 = 85 | CES55 = 84 | CES80 = 85 |
| CES06 = 52 | CES31 = 74 | CES56 = 75 | CES81 = 67 |
| CES07 = 42 | CES32 = 66 | CES57 = 75 | CES82 = 93 |
| CES08 = 41 | CES33 = 80 | CES58 = 76 | CES83 = 91 |
| CES09 = 29 | CES34 = 79 | CES59 = 85 | CES84 = 89 |
| CES10 = 77 | CES35 = 89 | CES60 = 90 | CES85 = 72 |
| CES11 = 60 | CES36 = 93 | CES61 = 81 | CES86 = 59 |
| CES12 = 66 | CES37 = 88 | CES62 = 91 | CES87 = 77 |
| CES13 = 43 | CES38 = 93 | CES63 = 77 | CES88 = 79 |
| CES14 = 74 | CES39 = 97 | CES64 = 67 | CES89 = 65 |
| CES15 = 72 | CES40 = 93 | CES65 = 66 | CES90 = 80 |
| CES16 = 48 | CES41 = 93 | CES66 = 63 | CES91 = 80 |
| CES17 = 51 | CES42 = 89 | CES67 = 61 | CES92 = 55 |
| CES18 = 57 | CES43 = 78 | CES68 = 68 | CES93 = 72 |
| CES19 = 73 | CES44 = 99 | CES69 = 78 | CES94 = 48 |
| CES20 = 67 | CES45 = 85 | CES70 = 63 | CES95 = 66 |
| CES21 = 88 | CES46 = 81 | CES71 = 61 | CES96 = 76 |
| CES22 = 80 | CES47 = 86 | CES72 = 86 | CES97 = 81 |
| CES23 = 92 | CES48 = 74 | CES73 = 56 | CES98 = 76 |
| CES24 = 91 | CES49 = 79 | CES74 = 93 | CES99 = 64 |
| CES25 = 73 | CES50 = 86 | CES75 = 66 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)