

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: STREETWORKS

Report Number: P868128

Luminaire Tested: **MEM2-HSN-SA-30-722-U-T4W-HSS**

Issue Date: 08/21/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P868128  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/21/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: MEM2-HSN-SA-30-722-U-T4W-HSS  
Description: EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 30W 70CRI 2200K  
FIXTURE w/ TYPE IV WIDE DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD  
Light Source: (10) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

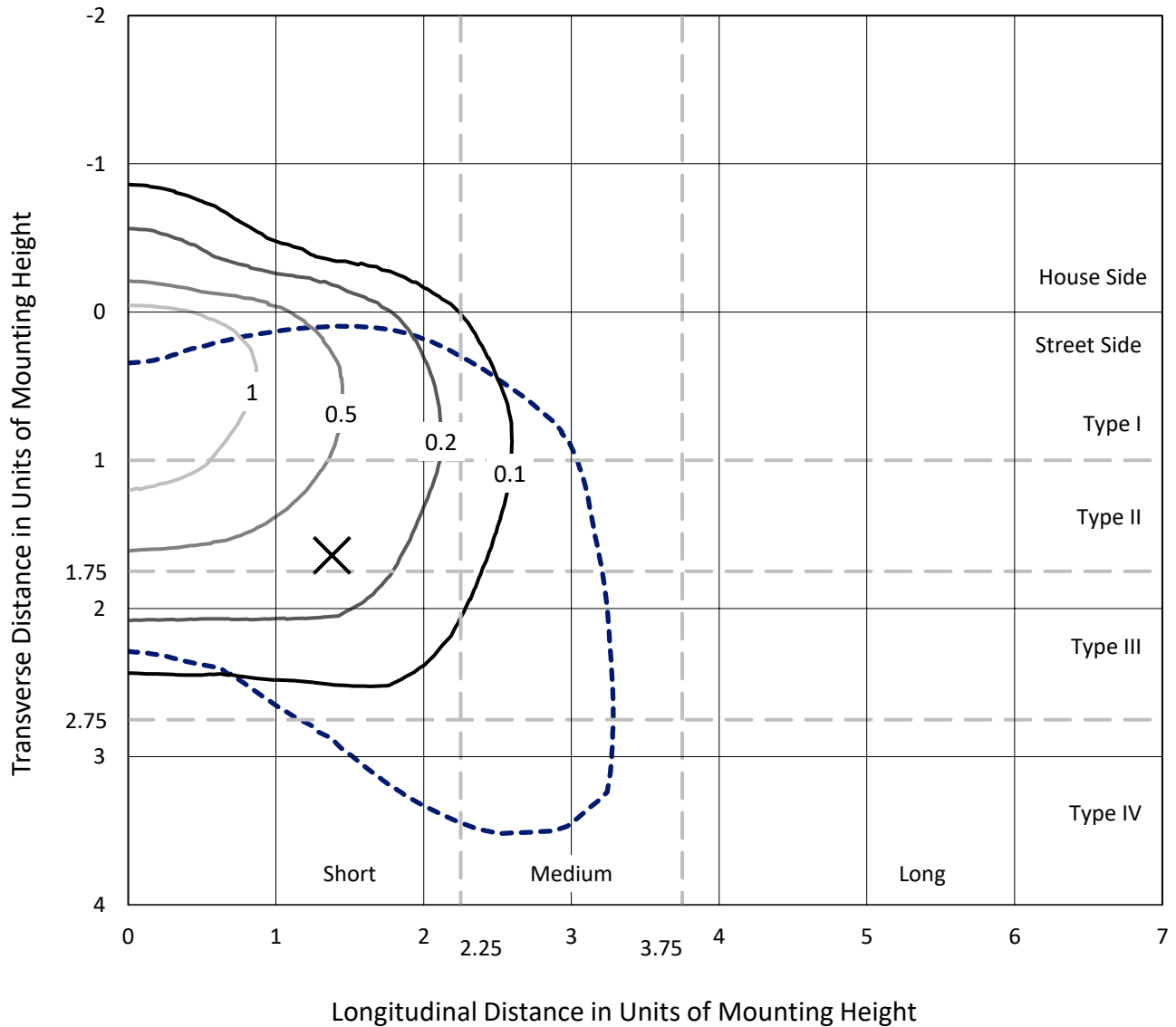
Lumens per Lamp: N/A  
Luminaire Lumens: 3015.7 lumens  
Efficiency: N/A  
Efficacy: 91.9 lumens/watt  
Luminous Opening: Rectangular (W 0.33' x L: 0.33' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B0 - U0 - G1

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

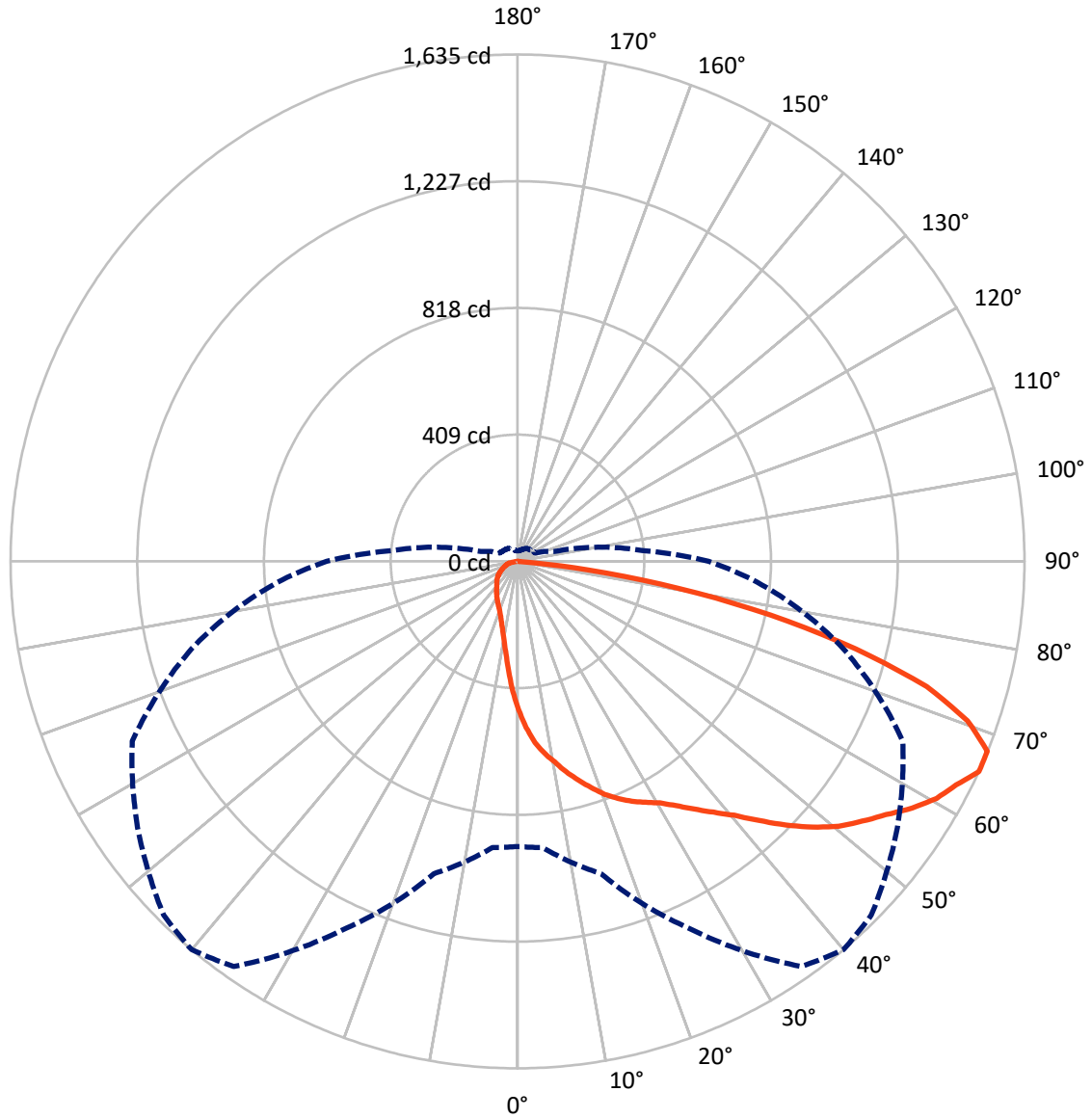
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 1.7 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 40-Deg Lateral      - - - Horizontal Cone Through 65-Deg Vertical

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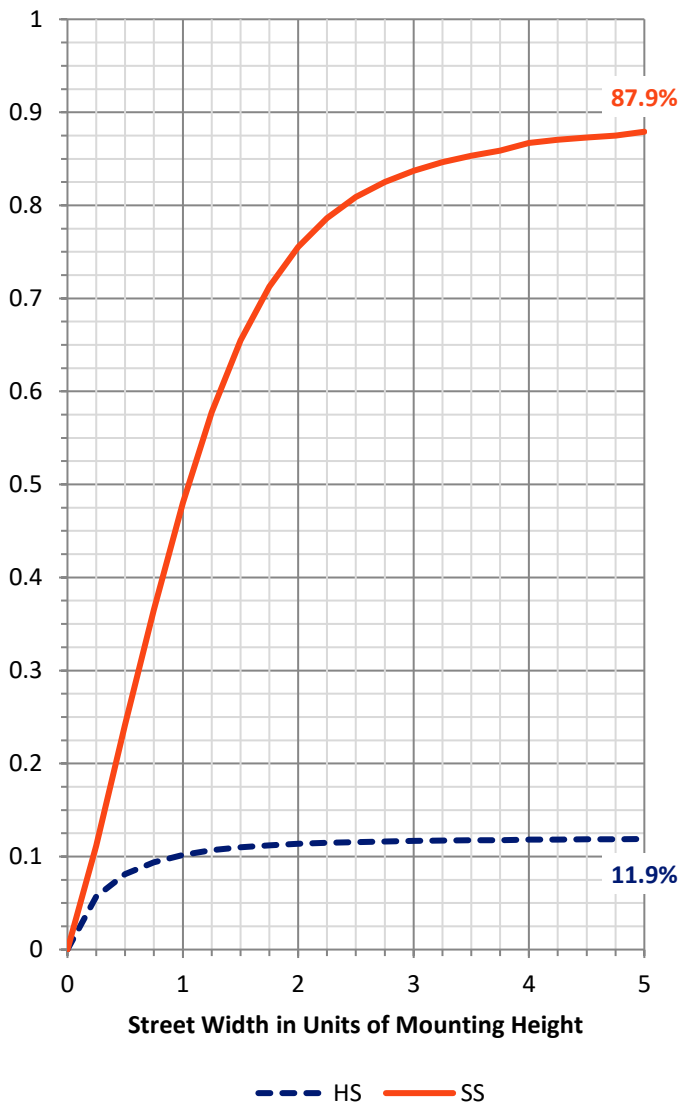
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 361.0    | 0.0    | 361.0  |
|                    | % Fixture | 12.0     | 0.0    | 12.0   |
| <b>Street Side</b> | Lumens    | 2654.7   | 0.0    | 2654.7 |
|                    | % Fixture | 88.0     | 0.0    | 88.0   |
| <b>Total</b>       | Lumens    | 3015.7   | 0.0    | 3015.7 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 44.9   | 1.5       |
| 10°-20°   | 134.9  | 4.5       |
| 20°-30°   | 232.1  | 7.7       |
| 30°-40°   | 350.9  | 11.6      |
| 40°-50°   | 513.0  | 17.0      |
| 50°-60°   | 655.3  | 21.7      |
| 60°-70°   | 654.0  | 21.7      |
| 70°-80°   | 383.5  | 12.7      |
| 80°-90°   | 47.2   | 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°    | 3015.7 | 100.0     |
| 0°-180°   | 3015.7 | 100.0     |

**Coefficient of Utilization**



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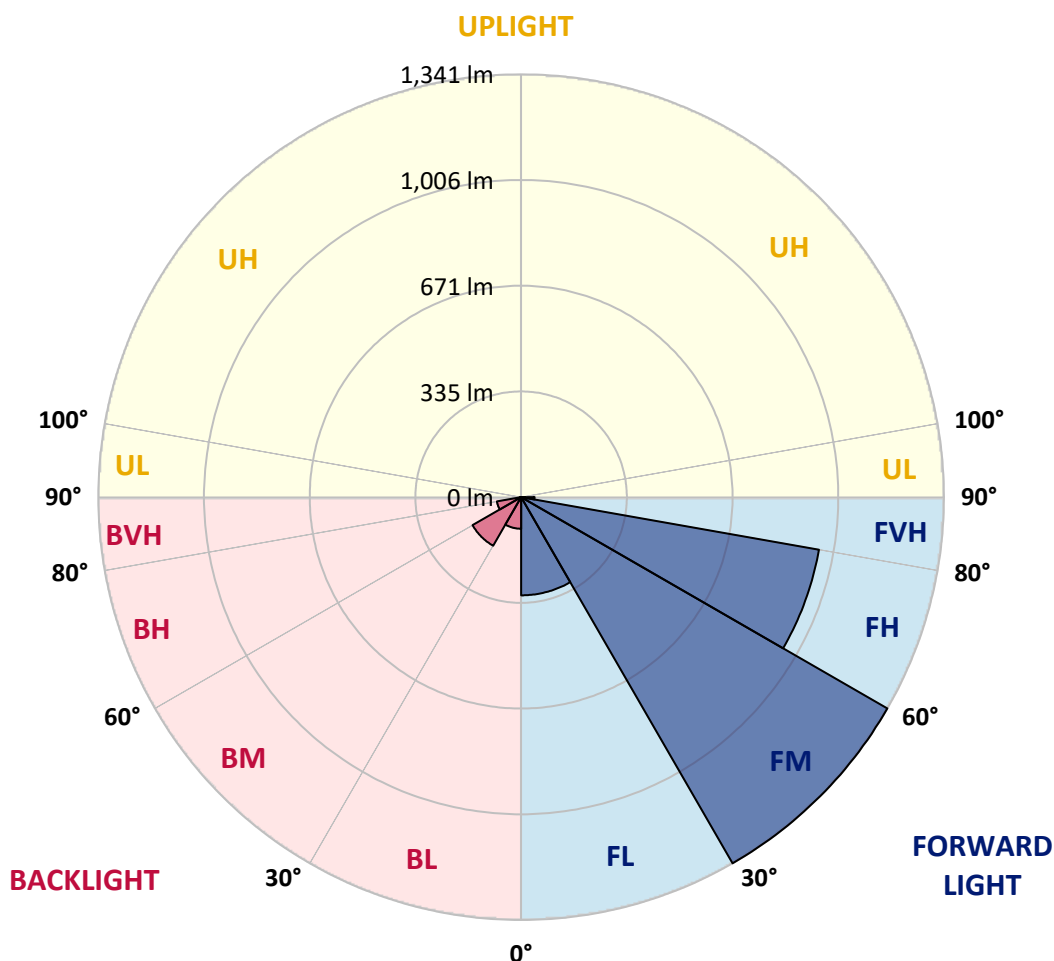
CATALOG NUMBER: MEM2-HSN-SA-30-722-U-T4W-HSS

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 311.5  | 10.3      |                         |      |         |
| FM (30°-60°)   | 1341.3 | 44.5      |                         |      |         |
| FH (60°-80°)   | 959.3  | 31.8      |                         |      | G1/1800 |
| FVH (80°-90°)  | 42.7   | 1.4       |                         |      | G1/100  |
| BL (0°-30°)    | 100.4  | 3.3       | B0/110                  |      |         |
| BM (30°-60°)   | 177.9  | 5.9       | B0/220                  |      |         |
| BH (60°-80°)   | 78.2   | 2.6       | B0/110                  |      | G0/110  |
| BVH (80°-90°)  | 4.5    | 0.2       |                         |      | 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 IV Short





REPORT NUMBER: P868128

CATALOG NUMBER: MEM2-HSN-SA-30-722-U-T4W-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 40°    | 45°    | 55°    | 65°    | 75°    | 85°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| 0°    | 479.4  | 479.4  | 479.4  | 479.4  | 479.4  | 479.4  | 479.4  | 479.4  | 479.4  | 479.4  | 479.4 |
| 2.5°  | 559.3  | 556.7  | 551.6  | 547.4  | 541.4  | 536.3  | 531.2  | 521.9  | 510.0  | 499.8  | 487.0 |
| 5°    | 614.5  | 610.3  | 606.9  | 601.8  | 591.6  | 587.3  | 583.9  | 564.4  | 544.0  | 522.7  | 494.7 |
| 7.5°  | 653.6  | 657.0  | 650.2  | 642.6  | 629.8  | 624.7  | 619.6  | 600.1  | 574.6  | 544.0  | 504.0 |
| 10°   | 698.7  | 699.5  | 691.0  | 681.7  | 668.1  | 657.9  | 651.1  | 627.3  | 599.2  | 565.2  | 514.2 |
| 12.5° | 742.0  | 742.0  | 736.9  | 723.3  | 705.5  | 696.1  | 684.2  | 657.0  | 623.0  | 583.1  | 526.1 |
| 15°   | 776.9  | 778.6  | 774.3  | 764.1  | 744.6  | 731.8  | 719.9  | 688.5  | 645.1  | 603.5  | 535.5 |
| 17.5° | 808.3  | 807.5  | 804.9  | 795.6  | 776.9  | 766.7  | 754.8  | 719.9  | 670.6  | 619.6  | 549.9 |
| 20°   | 829.6  | 829.6  | 828.7  | 823.6  | 810.0  | 802.4  | 787.9  | 751.4  | 698.7  | 643.4  | 565.2 |
| 22.5° | 845.7  | 844.9  | 844.9  | 845.7  | 838.1  | 830.4  | 824.5  | 787.9  | 727.6  | 663.8  | 580.5 |
| 25°   | 859.3  | 858.5  | 861.0  | 862.7  | 859.3  | 857.6  | 850.8  | 822.8  | 763.3  | 687.6  | 595.8 |
| 27.5° | 877.2  | 879.7  | 878.9  | 878.9  | 878.0  | 879.7  | 878.9  | 855.1  | 798.1  | 713.1  | 612.0 |
| 30°   | 905.2  | 909.5  | 906.9  | 903.5  | 903.5  | 904.4  | 908.6  | 893.3  | 838.9  | 744.6  | 629.8 |
| 32.5° | 970.7  | 966.4  | 948.6  | 936.7  | 938.4  | 939.2  | 943.5  | 935.0  | 879.7  | 780.3  | 648.5 |
| 35°   | 1045.5 | 1040.4 | 1020.8 | 993.6  | 984.3  | 980.9  | 980.0  | 974.9  | 923.9  | 818.5  | 670.6 |
| 37.5° | 1142.4 | 1144.1 | 1115.2 | 1076.1 | 1048.0 | 1026.8 | 1022.5 | 1011.5 | 962.2  | 853.4  | 693.6 |
| 40°   | 1241.0 | 1234.2 | 1209.5 | 1171.3 | 1116.0 | 1076.9 | 1064.2 | 1048.9 | 1005.5 | 889.9  | 715.7 |
| 42.5° | 1336.2 | 1323.4 | 1291.1 | 1249.5 | 1184.9 | 1142.4 | 1113.5 | 1093.9 | 1045.5 | 929.9  | 736.9 |
| 45°   | 1460.3 | 1423.7 | 1365.9 | 1328.5 | 1247.8 | 1212.9 | 1186.6 | 1143.2 | 1093.1 | 969.8  | 762.4 |
| 47.5° | 1558.0 | 1487.5 | 1434.8 | 1418.6 | 1313.2 | 1280.9 | 1257.1 | 1196.8 | 1141.5 | 1014.9 | 788.8 |
| 50°   | 1540.2 | 1496.8 | 1484.1 | 1469.6 | 1362.5 | 1343.0 | 1320.9 | 1258.0 | 1190.8 | 1062.5 | 814.3 |
| 52.5° | 1494.3 | 1499.4 | 1515.5 | 1490.9 | 1405.9 | 1392.3 | 1377.8 | 1323.4 | 1240.1 | 1101.6 | 837.2 |
| 55°   | 1457.7 | 1467.9 | 1511.3 | 1503.6 | 1457.7 | 1442.4 | 1432.2 | 1388.0 | 1287.7 | 1137.3 | 856.8 |
| 57.5° | 1391.4 | 1382.9 | 1437.3 | 1525.7 | 1513.0 | 1501.1 | 1490.9 | 1456.0 | 1336.2 | 1162.8 | 869.5 |
| 60°   | 1286.9 | 1255.4 | 1328.5 | 1498.5 | 1551.2 | 1552.9 | 1547.0 | 1507.0 | 1375.3 | 1162.8 | 862.7 |
| 62.5° | 1139.8 | 1110.1 | 1200.2 | 1407.6 | 1571.6 | 1587.8 | 1584.4 | 1524.9 | 1392.3 | 1137.3 | 836.4 |
| 65°   | 919.7  | 926.5  | 1042.9 | 1304.7 | 1595.4 | 1635.4 | 1614.1 | 1496.0 | 1371.0 | 1088.0 | 776.9 |
| 67.5° | 734.4  | 754.8  | 859.3  | 1171.3 | 1584.4 | 1634.5 | 1604.8 | 1414.4 | 1280.1 | 1019.1 | 685.9 |
| 70°   | 579.7  | 593.3  | 680.0  | 991.1  | 1487.5 | 1540.2 | 1502.8 | 1289.4 | 1126.2 | 912.9  | 570.3 |
| 72.5° | 453.0  | 465.8  | 539.7  | 793.0  | 1319.2 | 1380.4 | 1333.6 | 1121.1 | 934.1  | 774.3  | 453.0 |
| 75°   | 344.2  | 353.6  | 408.8  | 611.1  | 1050.6 | 1127.1 | 1093.1 | 897.6  | 729.3  | 612.8  | 346.8 |
| 77.5° | 221.8  | 234.6  | 296.6  | 428.4  | 742.0  | 833.8  | 838.1  | 670.6  | 524.4  | 442.8  | 255.0 |
| 80°   | 147.0  | 152.1  | 190.4  | 278.8  | 456.4  | 527.8  | 552.5  | 453.0  | 334.9  | 282.2  | 183.6 |
| 82.5° | 61.2   | 68.0   | 90.9   | 140.2  | 228.6  | 229.5  | 262.6  | 191.2  | 136.0  | 119.8  | 77.3  |
| 85°   | 1.7    | 3.4    | 2.5    | 6.8    | 5.9    | 9.3    | 11.0   | 15.3   | 11.0   | 11.9   | 11.9  |
| 87.5° | 0.0    | 0.0    | 0.8    | 0.8    | 1.7    | 1.7    | 1.7    | 1.7    | 1.7    | 2.5    | 1.7   |
| 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: P868128

CATALOG NUMBER: MEM2-HSN-SA-30-722-U-T4W-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 479.4 | 479.4 | 479.4 | 479.4 | 479.4 | 479.4 | 479.4 | 479.4 | 479.4 | 479.4 | 479.4 |
| 2.5°  | 481.1 | 473.4 | 458.1 | 446.2 | 433.5 | 424.1 | 415.6 | 406.3 | 400.3 | 401.2 | 395.2 |
| 5°    | 481.1 | 466.6 | 436.0 | 408.8 | 384.2 | 366.3 | 346.8 | 331.5 | 320.4 | 318.7 | 323.8 |
| 7.5°  | 483.6 | 459.8 | 413.9 | 373.1 | 339.1 | 311.1 | 290.7 | 275.4 | 267.7 | 262.6 | 261.8 |
| 10°   | 486.2 | 454.7 | 393.5 | 341.7 | 299.2 | 268.6 | 250.7 | 233.7 | 225.2 | 224.4 | 221.8 |
| 12.5° | 487.9 | 448.8 | 374.8 | 310.2 | 266.0 | 237.1 | 219.3 | 205.7 | 198.9 | 198.9 | 198.0 |
| 15°   | 493.8 | 447.1 | 355.3 | 286.4 | 240.5 | 212.5 | 197.2 | 186.1 | 181.9 | 179.3 | 178.5 |
| 17.5° | 498.9 | 443.7 | 338.3 | 262.6 | 217.6 | 192.9 | 178.5 | 170.8 | 166.6 | 164.9 | 164.0 |
| 20°   | 506.6 | 442.0 | 322.1 | 243.1 | 200.6 | 176.8 | 165.7 | 158.9 | 156.4 | 154.7 | 154.7 |
| 22.5° | 514.2 | 440.3 | 306.0 | 226.1 | 186.1 | 164.9 | 154.7 | 148.7 | 146.2 | 145.3 | 144.5 |
| 25°   | 523.6 | 439.4 | 292.4 | 211.6 | 173.4 | 155.5 | 146.2 | 141.1 | 137.7 | 136.0 | 136.0 |
| 27.5° | 532.9 | 440.3 | 278.8 | 197.2 | 162.3 | 147.0 | 137.7 | 131.7 | 129.2 | 125.8 | 126.6 |
| 30°   | 545.7 | 441.1 | 267.7 | 185.3 | 153.0 | 138.5 | 130.0 | 122.4 | 119.0 | 117.3 | 117.3 |
| 32.5° | 558.4 | 444.5 | 256.7 | 174.2 | 143.6 | 131.7 | 121.5 | 114.7 | 110.5 | 109.6 | 108.8 |
| 35°   | 572.0 | 447.1 | 246.5 | 164.9 | 136.0 | 124.1 | 113.9 | 107.1 | 103.7 | 102.8 | 102.8 |
| 37.5° | 587.3 | 451.3 | 238.8 | 156.4 | 128.3 | 116.4 | 107.1 | 100.3 | 97.7  | 96.9  | 96.9  |
| 40°   | 603.5 | 458.1 | 232.9 | 148.7 | 122.4 | 109.6 | 101.1 | 95.2  | 93.5  | 92.6  | 92.6  |
| 42.5° | 619.6 | 464.1 | 227.8 | 142.8 | 116.4 | 103.7 | 96.9  | 90.9  | 88.4  | 88.4  | 88.4  |
| 45°   | 634.9 | 468.3 | 222.7 | 136.8 | 110.5 | 99.4  | 91.8  | 86.7  | 84.1  | 84.1  | 84.1  |
| 47.5° | 648.5 | 472.6 | 215.0 | 130.9 | 104.5 | 93.5  | 87.5  | 82.4  | 79.9  | 79.9  | 79.9  |
| 50°   | 663.0 | 475.1 | 206.5 | 123.2 | 98.6  | 89.2  | 83.3  | 77.3  | 75.6  | 74.8  | 74.8  |
| 52.5° | 674.9 | 475.1 | 195.5 | 115.6 | 91.8  | 83.3  | 78.2  | 73.1  | 70.5  | 68.8  | 68.8  |
| 55°   | 683.4 | 475.1 | 183.6 | 106.2 | 85.0  | 78.2  | 73.1  | 68.0  | 64.6  | 62.0  | 62.0  |
| 57.5° | 688.5 | 472.6 | 170.0 | 95.2  | 78.2  | 71.4  | 68.0  | 62.0  | 55.2  | 50.1  | 48.4  |
| 60°   | 684.2 | 464.9 | 155.5 | 83.3  | 70.5  | 65.4  | 62.9  | 55.2  | 45.9  | 43.3  | 43.3  |
| 62.5° | 666.4 | 447.1 | 141.1 | 73.1  | 64.6  | 59.5  | 56.9  | 48.4  | 41.6  | 39.1  | 39.1  |
| 65°   | 616.2 | 403.7 | 123.2 | 63.7  | 57.8  | 54.4  | 51.0  | 43.3  | 37.4  | 34.0  | 34.0  |
| 67.5° | 543.1 | 348.5 | 102.8 | 56.1  | 51.8  | 49.3  | 46.7  | 39.1  | 33.1  | 29.7  | 29.7  |
| 70°   | 440.3 | 281.3 | 87.5  | 49.3  | 45.9  | 44.2  | 41.6  | 35.7  | 28.9  | 26.3  | 26.3  |
| 72.5° | 345.9 | 221.0 | 73.1  | 44.2  | 42.5  | 39.1  | 37.4  | 31.4  | 26.3  | 23.8  | 23.8  |
| 75°   | 257.5 | 164.9 | 64.6  | 39.1  | 39.1  | 34.8  | 34.0  | 28.0  | 22.9  | 21.2  | 21.2  |
| 77.5° | 189.5 | 122.4 | 56.1  | 34.0  | 34.0  | 30.6  | 28.9  | 24.6  | 21.2  | 19.5  | 19.5  |
| 80°   | 128.3 | 83.3  | 41.6  | 25.5  | 25.5  | 24.6  | 22.9  | 21.2  | 17.8  | 16.1  | 15.3  |
| 82.5° | 54.4  | 34.8  | 20.4  | 12.7  | 11.9  | 9.3   | 7.6   | 5.9   | 5.9   | 5.1   | 5.1   |
| 85°   | 9.3   | 4.2   | 4.2   | 3.4   | 2.5   | 2.5   | 2.5   | 1.7   | 1.7   | 1.7   | 1.7   |
| 87.5° | 1.7   | 1.7   | 1.7   | 1.7   | 1.7   | 1.7   | 0.8   | 0.8   | 0.8   | 0.8   | 0.8   |
| 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: SP1-2407-157-2

Test Date: 08/07/2024

Luminaire Tested: MEM2-HTN-SA-30-722-U-5WQ-2

Data in this report applies to families of products including MEM2-HTN-SA-30-722-U-5WQ-2

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-2  
 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-30-722-U-5WQ-2**  
 Description: Epic Modern Light Square 30W 5WQ Optic and Flare Trim

**Spectral Parameters**

CCT (K): 2253  
 CIE u': 0.2868  
 CIE v': 0.5332  
 Duv: -0.0014  
 CIE x: 0.4974  
 CIE y: 0.4110  
 CIE z: 0.0915  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 587  
 Purity: 72.69432  
 Rf: 76.9  
 Rg: 92.7

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 70.6 |      |       |
| R1:       | 68.4 | R9:  | -36.0 |
| R2:       | 88.7 | R10: | 78.2  |
| R3:       | 85.4 | R11: | 61.0  |
| R4:       | 63.5 | R12: | 74.2  |
| R5:       | 69.0 | R13: | 72.8  |
| R6:       | 88.9 | R14: | 92.2  |
| R7:       | 68.5 | R15: | 58.0  |
| R8:       | 32.0 |      |       |



**Test Conditions**

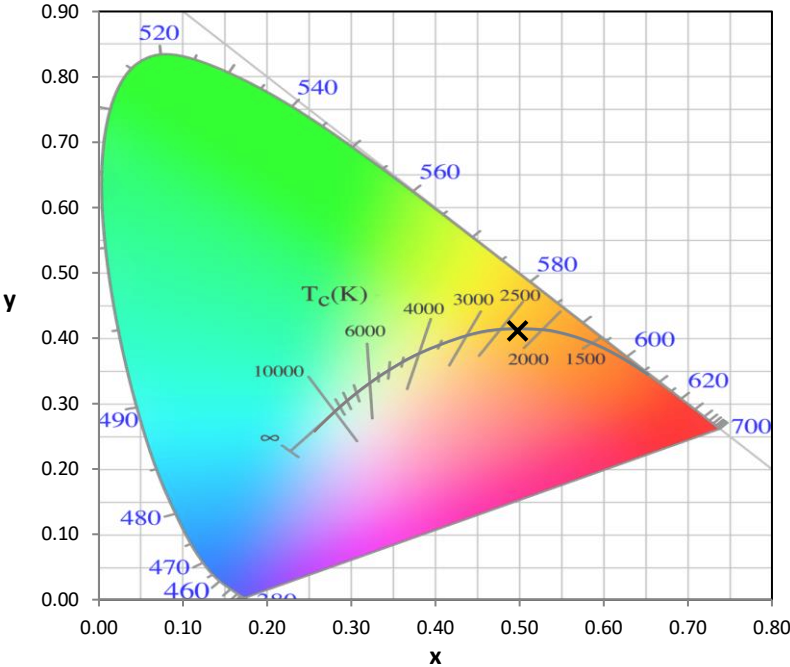
Stabilization Time: 29M  
 Operation Time: 1H 29M  
 Sphere Temperature (°C): 24.1

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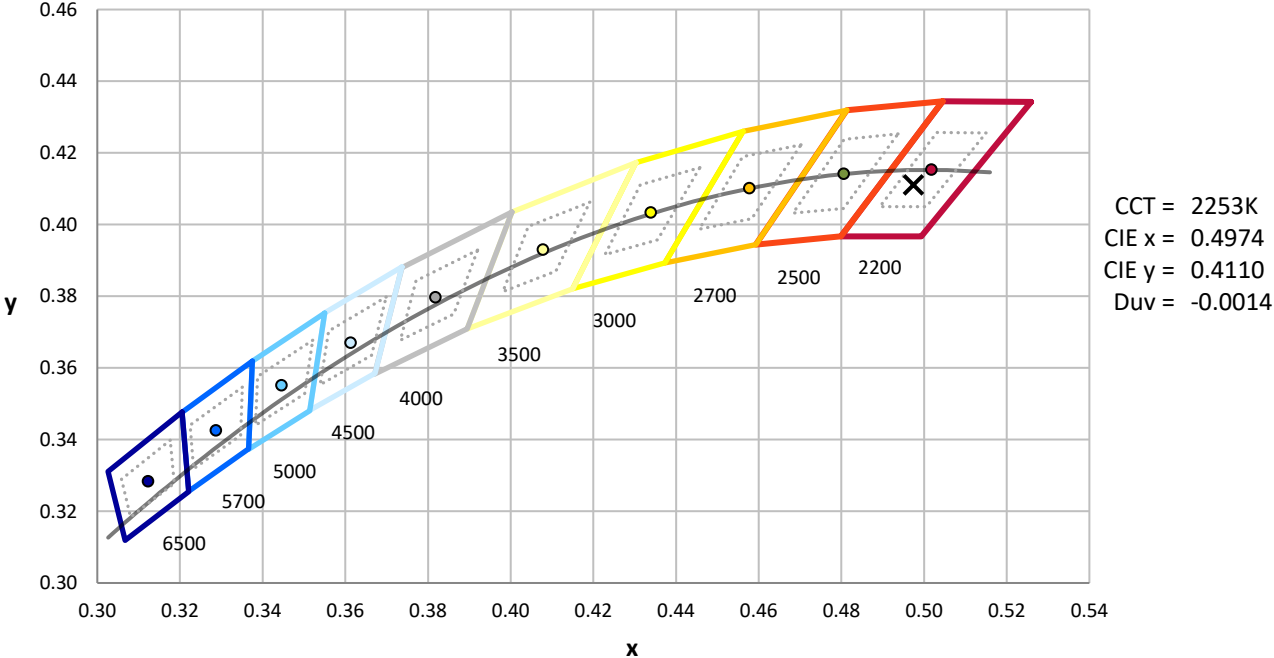
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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 2200K 4-step quadrangle

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**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               | 117                         | NR                      | 620               | 896                         | NR                      | 750               | 20                          | NR                      | 880               | 0                           | NR                      |
| 365               | 0                           | NR                      | 495               | 137                         | NR                      | 625               | 838                         | NR                      | 755               | 17                          | NR                      | 885               | 0                           | NR                      |
| 370               | 0                           | NR                      | 500               | 160                         | NR                      | 630               | 774                         | NR                      | 760               | 14                          | NR                      | 890               | 0                           | NR                      |
| 375               | 0                           | NR                      | 505               | 183                         | NR                      | 635               | 704                         | NR                      | 765               | 12                          | NR                      | 895               | 0                           | NR                      |
| 380               | 0                           | NR                      | 510               | 202                         | NR                      | 640               | 635                         | NR                      | 770               | 10                          | NR                      | 900               | 0                           | NR                      |
| 385               | 0                           | NR                      | 515               | 219                         | NR                      | 645               | 565                         | NR                      | 775               | 9                           | NR                      | 905               | 0                           | NR                      |
| 390               | 0                           | NR                      | 520               | 235                         | NR                      | 650               | 501                         | NR                      | 780               | 7                           | NR                      | 910               | 0                           | NR                      |
| 395               | 0                           | NR                      | 525               | 249                         | NR                      | 655               | 440                         | NR                      | 785               | 6                           | NR                      | 915               | 0                           | NR                      |
| 400               | 0                           | NR                      | 530               | 263                         | NR                      | 660               | 383                         | NR                      | 790               | 5                           | NR                      | 920               | 0                           | NR                      |
| 405               | 0                           | NR                      | 535               | 281                         | NR                      | 665               | 332                         | NR                      | 795               | 5                           | NR                      | 925               | 0                           | NR                      |
| 410               | 1                           | NR                      | 540               | 302                         | NR                      | 670               | 286                         | NR                      | 800               | 4                           | NR                      | 930               | 0                           | NR                      |
| 415               | 3                           | NR                      | 545               | 331                         | NR                      | 675               | 245                         | NR                      | 805               | 3                           | NR                      | 935               | 0                           | NR                      |
| 420               | 6                           | NR                      | 550               | 366                         | NR                      | 680               | 210                         | NR                      | 810               | 3                           | NR                      | 940               | 0                           | NR                      |
| 425               | 12                          | NR                      | 555               | 411                         | NR                      | 685               | 178                         | NR                      | 815               | 3                           | NR                      | 945               | 0                           | NR                      |
| 430               | 21                          | NR                      | 560               | 469                         | NR                      | 690               | 152                         | NR                      | 820               | 2                           | NR                      | 950               | 0                           | NR                      |
| 435               | 38                          | NR                      | 565               | 536                         | NR                      | 695               | 129                         | NR                      | 825               | 2                           | NR                      | 955               | 0                           | NR                      |
| 440               | 66                          | NR                      | 570               | 614                         | NR                      | 700               | 109                         | NR                      | 830               | 2                           | NR                      | 960               | 0                           | NR                      |
| 445               | 122                         | NR                      | 575               | 701                         | NR                      | 705               | 92                          | NR                      | 835               | 1                           | NR                      | 965               | 0                           | NR                      |
| 450               | 215                         | NR                      | 580               | 785                         | NR                      | 710               | 77                          | NR                      | 840               | 1                           | NR                      | 970               | 0                           | NR                      |
| 455               | 236                         | NR                      | 585               | 863                         | NR                      | 715               | 66                          | NR                      | 845               | 1                           | NR                      | 975               | 0                           | NR                      |
| 460               | 170                         | NR                      | 590               | 928                         | NR                      | 720               | 55                          | NR                      | 850               | 1                           | NR                      | 980               | 0                           | NR                      |
| 465               | 148                         | NR                      | 595               | 971                         | NR                      | 725               | 47                          | NR                      | 855               | 1                           | NR                      | 985               | 0                           | NR                      |
| 470               | 132                         | NR                      | 600               | 994                         | NR                      | 730               | 40                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 104                         | NR                      | 605               | 996                         | NR                      | 735               | 33                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 97                          | NR                      | 610               | 979                         | NR                      | 740               | 28                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 105                         | NR                      | 615               | 943                         | NR                      | 745               | 24                          | NR                      | 875               | 0                           | NR                      |                   |                             |                         |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 0.96**

| 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    | 117                      | NR            | 620    | 896                      | NR            | 750    | 20                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 137                      | NR            | 625    | 838                      | NR            | 755    | 17                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 160                      | NR            | 630    | 774                      | NR            | 760    | 14                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 183                      | NR            | 635    | 704                      | NR            | 765    | 12                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 202                      | NR            | 640    | 635                      | NR            | 770    | 10                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 219                      | NR            | 645    | 565                      | NR            | 775    | 9                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 235                      | NR            | 650    | 501                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 0                        | NR            | 525    | 249                      | NR            | 655    | 440                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 0                        | NR            | 530    | 263                      | NR            | 660    | 383                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 0                        | NR            | 535    | 281                      | NR            | 665    | 332                      | NR            | 795    | 5                        | NR            | 925    | 0                        | NR            |
| 410    | 1                        | NR            | 540    | 302                      | NR            | 670    | 286                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 3                        | NR            | 545    | 331                      | NR            | 675    | 245                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 6                        | NR            | 550    | 366                      | NR            | 680    | 210                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 12                       | NR            | 555    | 411                      | NR            | 685    | 178                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 21                       | NR            | 560    | 469                      | NR            | 690    | 152                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 38                       | NR            | 565    | 536                      | NR            | 695    | 129                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 66                       | NR            | 570    | 614                      | NR            | 700    | 109                      | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 122                      | NR            | 575    | 701                      | NR            | 705    | 92                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 215                      | NR            | 580    | 785                      | NR            | 710    | 77                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 236                      | NR            | 585    | 863                      | NR            | 715    | 66                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 170                      | NR            | 590    | 928                      | NR            | 720    | 55                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 148                      | NR            | 595    | 971                      | NR            | 725    | 47                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 132                      | NR            | 600    | 994                      | NR            | 730    | 40                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 104                      | NR            | 605    | 996                      | NR            | 735    | 33                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 97                       | NR            | 610    | 979                      | NR            | 740    | 28                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 105                      | NR            | 615    | 943                      | NR            | 745    | 24                       | NR            | 875    | 0                        | NR            |        |                          |               |

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Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 1.71

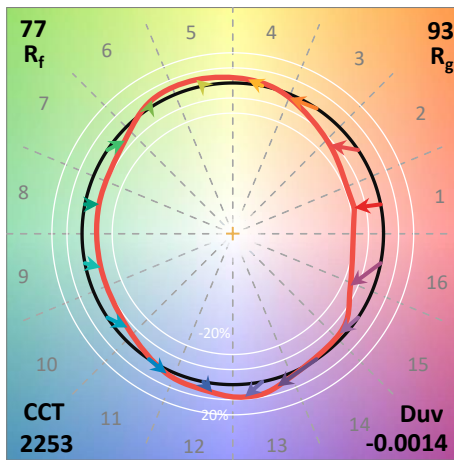
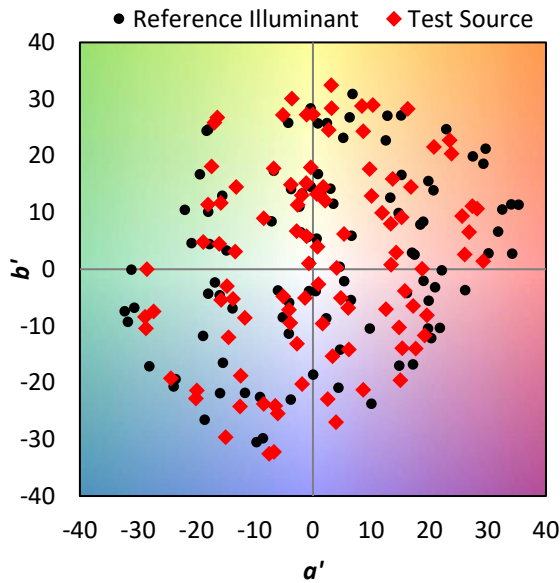
| λ (nm) | Power W <sup>2</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>2</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>2</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>2</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>2</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 117                      | NR            | 620    | 896                      | NR            | 750    | 20                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 137                      | NR            | 625    | 838                      | NR            | 755    | 17                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 160                      | NR            | 630    | 774                      | NR            | 760    | 14                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 183                      | NR            | 635    | 704                      | NR            | 765    | 12                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 202                      | NR            | 640    | 635                      | NR            | 770    | 10                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 219                      | NR            | 645    | 565                      | NR            | 775    | 9                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 235                      | NR            | 650    | 501                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 0                        | NR            | 525    | 249                      | NR            | 655    | 440                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 0                        | NR            | 530    | 263                      | NR            | 660    | 383                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 0                        | NR            | 535    | 281                      | NR            | 665    | 332                      | NR            | 795    | 5                        | NR            | 925    | 0                        | NR            |
| 410    | 1                        | NR            | 540    | 302                      | NR            | 670    | 286                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 3                        | NR            | 545    | 331                      | NR            | 675    | 245                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 6                        | NR            | 550    | 366                      | NR            | 680    | 210                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 12                       | NR            | 555    | 411                      | NR            | 685    | 178                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 21                       | NR            | 560    | 469                      | NR            | 690    | 152                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 38                       | NR            | 565    | 536                      | NR            | 695    | 129                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 66                       | NR            | 570    | 614                      | NR            | 700    | 109                      | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 122                      | NR            | 575    | 701                      | NR            | 705    | 92                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 215                      | NR            | 580    | 785                      | NR            | 710    | 77                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 236                      | NR            | 585    | 863                      | NR            | 715    | 66                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 170                      | NR            | 590    | 928                      | NR            | 720    | 55                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 148                      | NR            | 595    | 971                      | NR            | 725    | 47                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 132                      | NR            | 600    | 994                      | NR            | 730    | 40                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 104                      | NR            | 605    | 996                      | NR            | 735    | 33                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 97                       | NR            | 610    | 979                      | NR            | 740    | 28                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 105                      | NR            | 615    | 943                      | NR            | 745    | 24                       | NR            | 875    | 0                        | NR            |        |                          |               |

**Summary**

$R_f = 76.9$   
 $R_g = 92.7$   
 CIE  $R_a = 70.6$   
 $R_9 = -36.0$



**Color Vector Graphics**



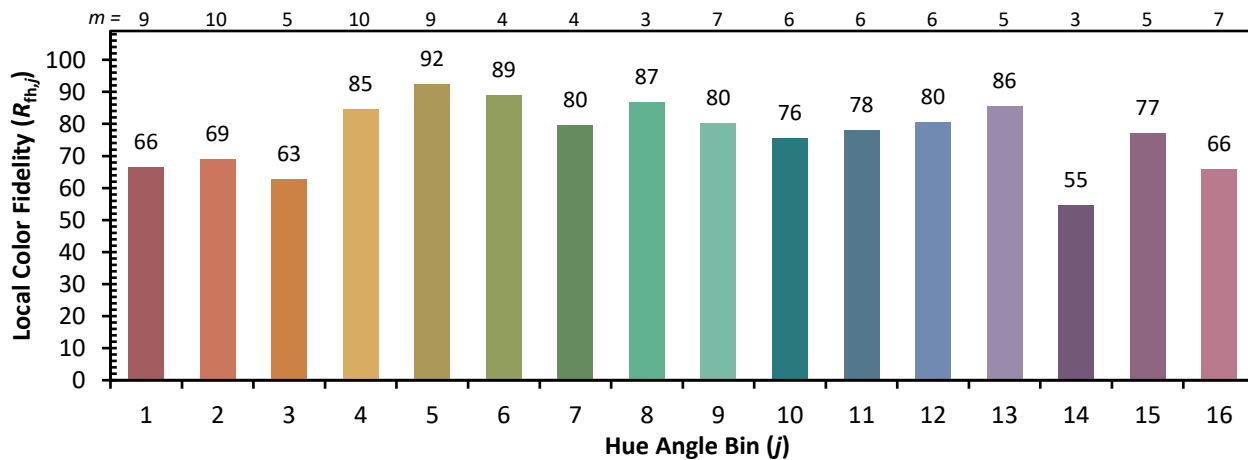


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 76 | CES51 = 88 | CES76 = 78 |
| CES02 = 65 | CES27 = 94 | CES52 = 85 | CES77 = 75 |
| CES03 = 32 | CES28 = 93 | CES53 = 80 | CES78 = 79 |
| CES04 = 72 | CES29 = 81 | CES54 = 86 | CES79 = 82 |
| CES05 = 51 | CES30 = 91 | CES55 = 83 | CES80 = 81 |
| CES06 = 52 | CES31 = 83 | CES56 = 77 | CES81 = 51 |
| CES07 = 44 | CES32 = 75 | CES57 = 75 | CES82 = 92 |
| CES08 = 42 | CES33 = 88 | CES58 = 76 | CES83 = 88 |
| CES09 = 29 | CES34 = 88 | CES59 = 84 | CES84 = 90 |
| CES10 = 79 | CES35 = 94 | CES60 = 91 | CES85 = 65 |
| CES11 = 62 | CES36 = 90 | CES61 = 82 | CES86 = 48 |
| CES12 = 68 | CES37 = 97 | CES62 = 91 | CES87 = 76 |
| CES13 = 45 | CES38 = 98 | CES63 = 86 | CES88 = 78 |
| CES14 = 75 | CES39 = 97 | CES64 = 70 | CES89 = 61 |
| CES15 = 72 | CES40 = 94 | CES65 = 71 | CES90 = 80 |
| CES16 = 48 | CES41 = 95 | CES66 = 71 | CES91 = 80 |
| CES17 = 51 | CES42 = 89 | CES67 = 70 | CES92 = 51 |
| CES18 = 57 | CES43 = 80 | CES68 = 74 | CES93 = 68 |
| CES19 = 74 | CES44 = 99 | CES69 = 84 | CES94 = 44 |
| CES20 = 68 | CES45 = 83 | CES70 = 72 | CES95 = 66 |
| CES21 = 88 | CES46 = 81 | CES71 = 75 | CES96 = 75 |
| CES22 = 81 | CES47 = 88 | CES72 = 89 | CES97 = 76 |
| CES23 = 92 | CES48 = 73 | CES73 = 68 | CES98 = 72 |
| CES24 = 92 | CES49 = 82 | CES74 = 85 | CES99 = 63 |
| CES25 = 73 | CES50 = 87 | CES75 = 80 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)