

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: P870713

Luminaire Tested: **EMM2-HTN-SA1B-840-U-T2U**

Issue Date: 09/05/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P870713  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 09/05/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: EMM2-HTN-SA1B-840-U-T2U  
Description: EPIC MODERN TALL HOUSING DISCRETE LED ARRAYS 60W 80CRI 4000K  
FIXTURE w/ TYPE II URBAN DISTRIBUTION OPTIC  
Light Source: (10) 4000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

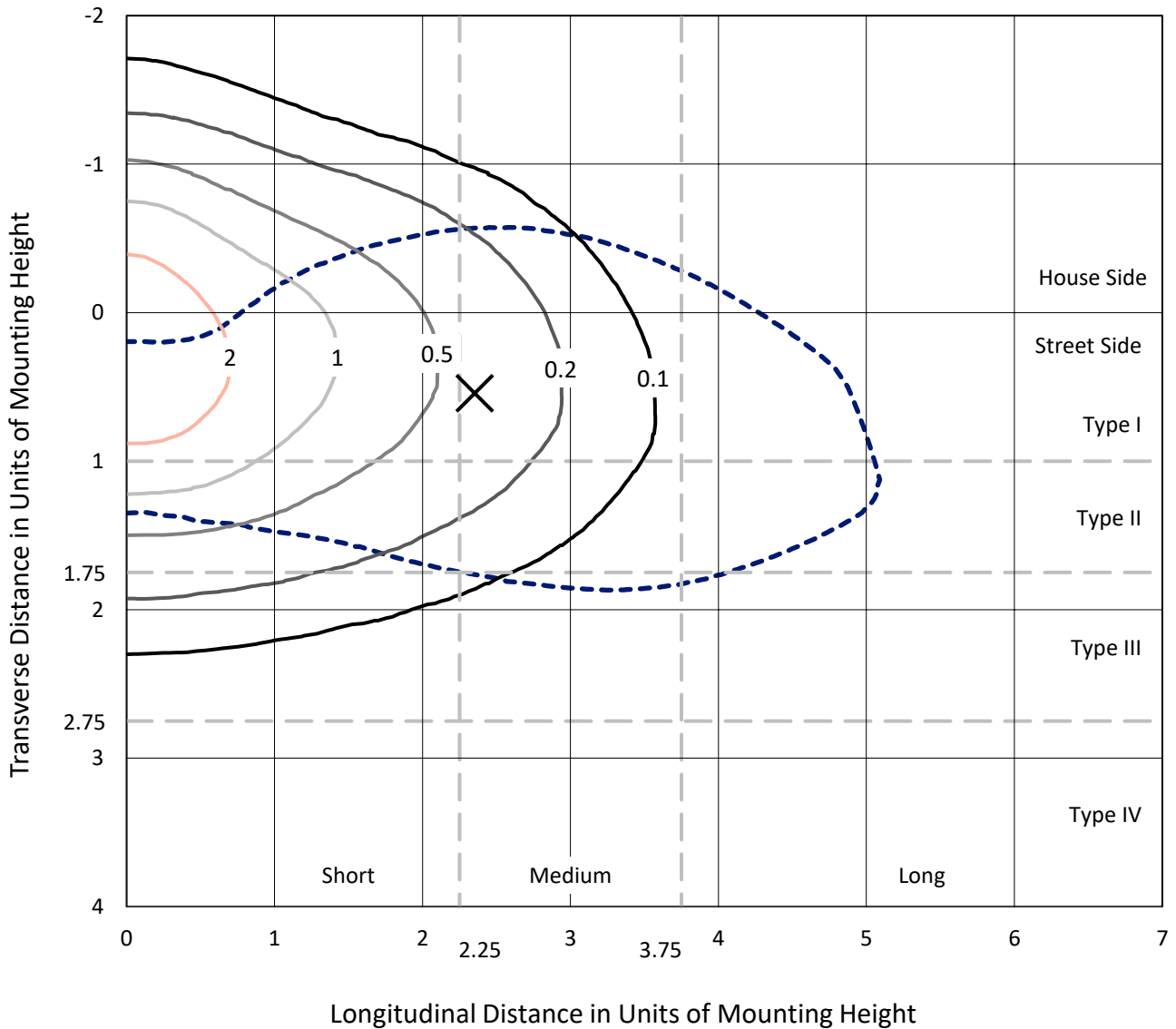
Lumens per Lamp: N/A  
Luminaire Lumens: 5985.9 lumens  
Efficiency: N/A  
Efficacy: 136.0 lumens/watt  
Luminous Opening: Rectangular (W 0.33' x L: 0.33' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B2 - U0 - G2

Input Watts (W): 44  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): NR  
Voltage Rise (V): NR  
Power Factor: 0.99  
Total Harmonic Distortion (THDi): 6.91%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT

REPORT NUMBER: P870713  
 CATALOG NUMBER: EMM2-HTN-SA1B-840-U-T2U

### Iso-Footcandle Lines of Horizontal Illumination

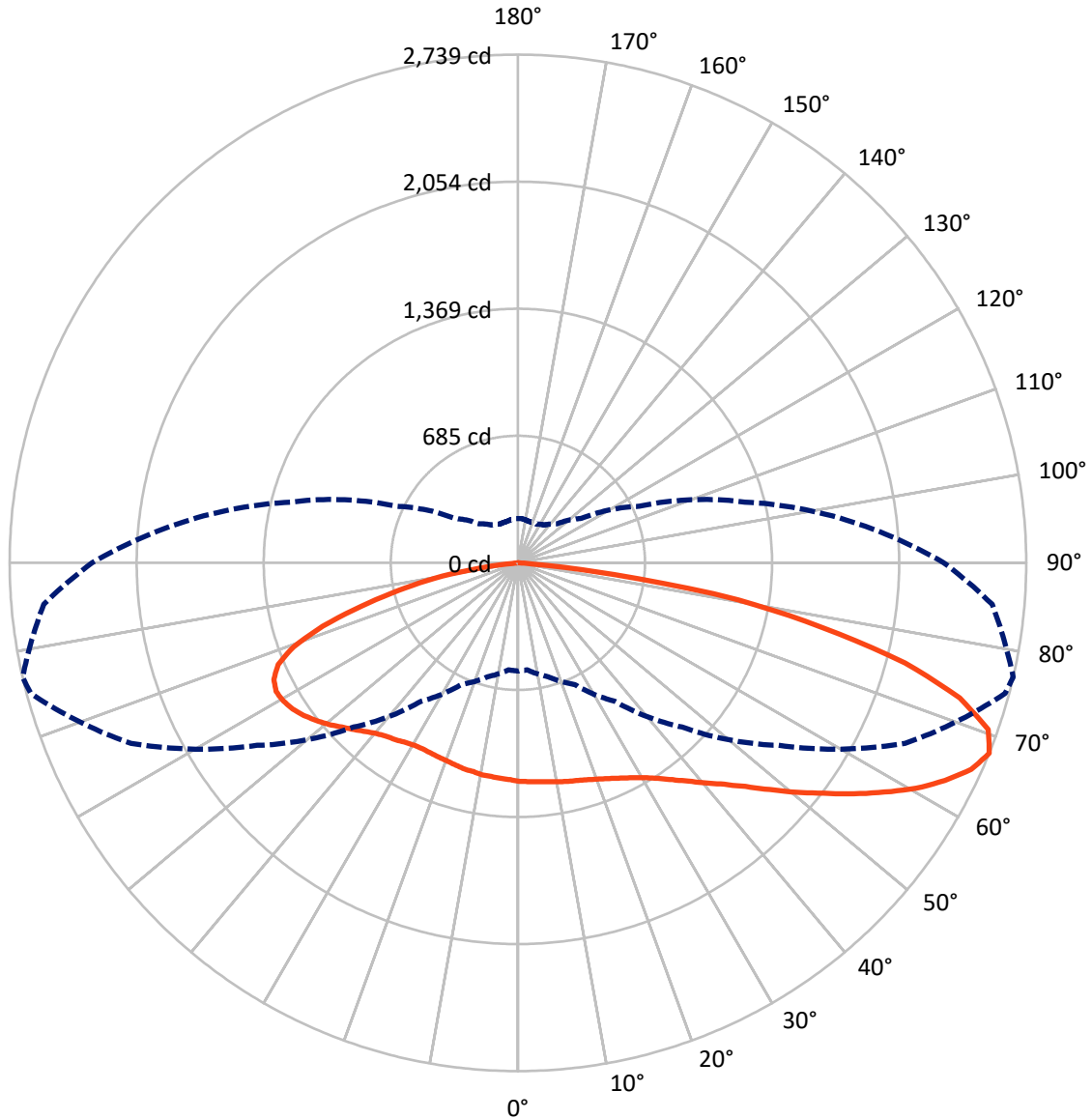
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 3.2 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    | 1990.5   | 0.0    | 1990.5 |
|                    | % Fixture | 33.3     | 0.0    | 33.3   |
| <b>Street Side</b> | Lumens    | 3995.4   | 0.0    | 3995.4 |
|                    | % Fixture | 66.7     | 0.0    | 66.7   |
| <b>Total</b>       | Lumens    | 5985.9   | 0.0    | 5985.9 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 113.1  | 1.9       |
| 10°-20°   | 343.1  | 5.7       |
| 20°-30°   | 578.4  | 9.7       |
| 30°-40°   | 820.7  | 13.7      |
| 40°-50°   | 1038.4 | 17.3      |
| 50°-60°   | 1137.5 | 19.0      |
| 60°-70°   | 1099.6 | 18.4      |
| 70°-80°   | 739.5  | 12.4      |
| 80°-90°   | 115.6  | 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°    | 5985.9 | 100.0     |
| 0°-180°   | 5985.9 | 100.0     |



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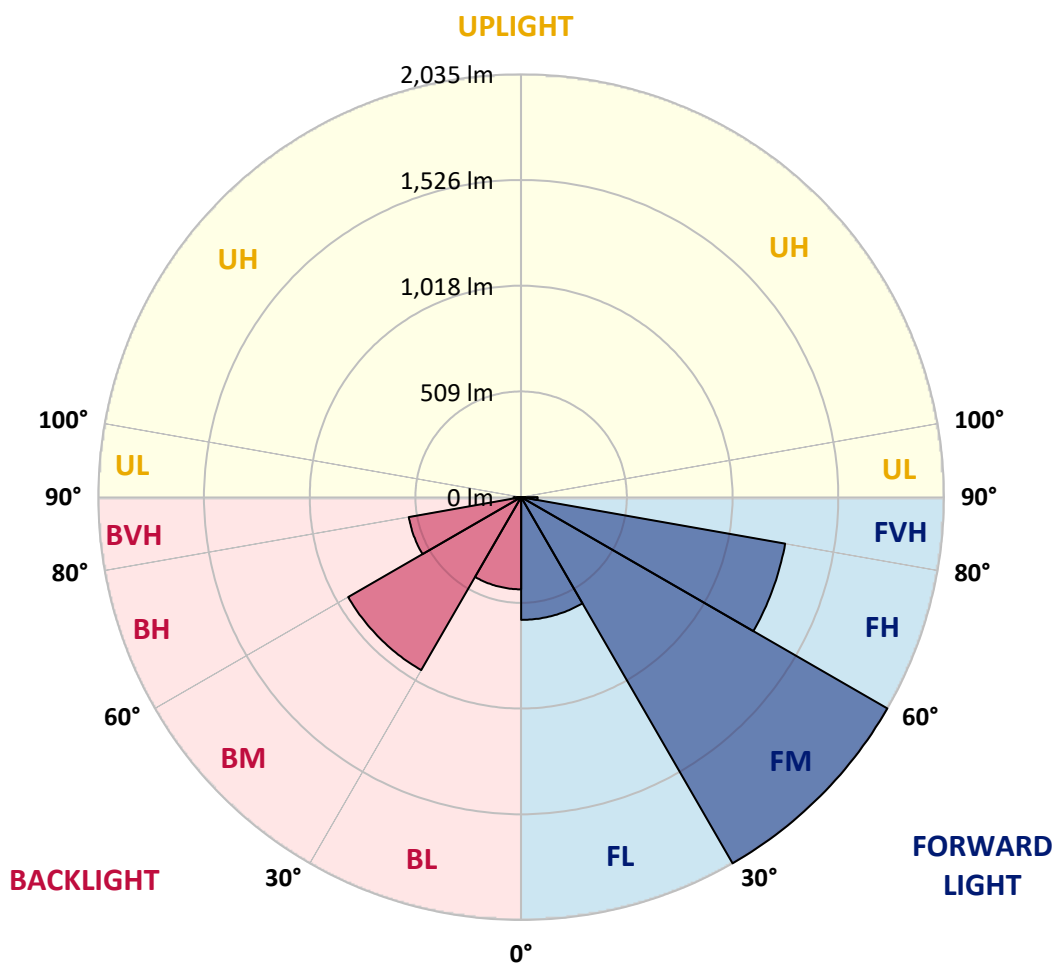
CATALOG NUMBER: EMM2-HTN-SA1B-840-U-T2U

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 590.8  | 9.9       |                         |      |         |
| FM (30°-60°)   | 2035.3 | 34.0      |                         |      |         |
| FH (60°-80°)   | 1290.1 | 21.6      |                         |      | G1/1800 |
| FVH (80°-90°)  | 79.1   | 1.3       |                         |      | G1/100  |
| BL (0°-30°)    | 443.7  | 7.4       | B1/500                  |      |         |
| BM (30°-60°)   | 961.4  | 16.1      | B1/1000                 |      |         |
| BH (60°-80°)   | 549.0  | 9.2       | B2/1000                 |      | G2/1000 |
| BVH (80°-90°)  | 36.4   | 0.6       |                         |      | G1/100  |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type III Medium





REPORT NUMBER: P870713

CATALOG NUMBER: EMM2-HTN-SA1B-840-U-T2U

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 77°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 |
| 2.5°  | 1202.9 | 1201.7 | 1195.8 | 1198.2 | 1191.1 | 1195.8 | 1188.7 | 1182.8 | 1181.6 | 1180.4 | 1181.6 |
| 5°    | 1240.8 | 1234.9 | 1229.0 | 1225.4 | 1219.5 | 1217.1 | 1205.3 | 1193.5 | 1186.4 | 1185.2 | 1182.8 |
| 7.5°  | 1284.6 | 1282.3 | 1274.0 | 1269.2 | 1252.7 | 1244.4 | 1227.8 | 1206.5 | 1195.8 | 1191.1 | 1185.2 |
| 10°   | 1329.6 | 1335.5 | 1324.9 | 1315.4 | 1296.5 | 1278.7 | 1250.3 | 1223.1 | 1201.7 | 1199.4 | 1186.4 |
| 12.5° | 1385.3 | 1384.1 | 1377.0 | 1360.4 | 1337.9 | 1313.0 | 1278.7 | 1240.8 | 1212.4 | 1207.7 | 1188.7 |
| 15°   | 1435.0 | 1433.8 | 1424.3 | 1408.9 | 1379.3 | 1348.6 | 1302.4 | 1258.6 | 1223.1 | 1216.0 | 1193.5 |
| 17.5° | 1481.2 | 1478.8 | 1472.9 | 1456.3 | 1419.6 | 1381.7 | 1336.7 | 1278.7 | 1236.1 | 1227.8 | 1197.0 |
| 20°   | 1521.4 | 1523.8 | 1516.7 | 1500.1 | 1465.8 | 1425.5 | 1368.7 | 1304.8 | 1252.7 | 1243.2 | 1207.7 |
| 22.5° | 1565.2 | 1566.4 | 1562.9 | 1556.9 | 1513.1 | 1470.5 | 1408.9 | 1334.4 | 1271.6 | 1262.1 | 1219.5 |
| 25°   | 1611.4 | 1612.6 | 1615.0 | 1611.4 | 1561.7 | 1515.5 | 1450.4 | 1371.1 | 1297.7 | 1284.6 | 1236.1 |
| 27.5° | 1664.7 | 1665.9 | 1670.6 | 1663.5 | 1610.2 | 1561.7 | 1496.6 | 1410.1 | 1324.9 | 1310.7 | 1250.3 |
| 30°   | 1725.1 | 1729.8 | 1726.3 | 1723.9 | 1662.3 | 1615.0 | 1542.7 | 1450.4 | 1360.4 | 1342.6 | 1275.2 |
| 32.5° | 1797.3 | 1796.1 | 1789.0 | 1781.9 | 1719.2 | 1669.4 | 1594.8 | 1502.5 | 1404.2 | 1384.1 | 1315.4 |
| 35°   | 1849.4 | 1849.4 | 1838.7 | 1835.2 | 1777.2 | 1725.1 | 1651.7 | 1560.5 | 1453.9 | 1435.0 | 1358.0 |
| 37.5° | 1881.4 | 1886.1 | 1877.8 | 1880.2 | 1824.5 | 1776.0 | 1708.5 | 1619.7 | 1508.4 | 1491.8 | 1410.1 |
| 40°   | 1893.2 | 1905.0 | 1912.1 | 1921.6 | 1866.0 | 1824.5 | 1768.9 | 1683.6 | 1578.3 | 1559.3 | 1472.9 |
| 42.5° | 1895.6 | 1913.3 | 1938.2 | 1958.3 | 1895.6 | 1861.2 | 1826.9 | 1748.7 | 1646.9 | 1630.4 | 1541.6 |
| 45°   | 1883.7 | 1875.4 | 1935.8 | 1938.2 | 1912.1 | 1890.8 | 1877.8 | 1826.9 | 1746.4 | 1719.2 | 1626.8 |
| 47.5° | 1793.7 | 1784.3 | 1800.8 | 1876.6 | 1892.0 | 1903.9 | 1929.9 | 1918.1 | 1845.8 | 1824.5 | 1725.1 |
| 50°   | 1648.1 | 1643.4 | 1709.7 | 1791.4 | 1842.3 | 1902.7 | 1972.5 | 2005.7 | 1955.9 | 1942.9 | 1849.4 |
| 52.5° | 1407.8 | 1394.7 | 1529.7 | 1688.4 | 1777.2 | 1890.8 | 2002.1 | 2095.7 | 2080.3 | 2061.3 | 1955.9 |
| 55°   | 1255.0 | 1255.0 | 1346.2 | 1543.9 | 1694.3 | 1848.2 | 2021.1 | 2190.4 | 2217.6 | 2196.3 | 2077.9 |
| 57.5° | 1091.6 | 1104.7 | 1199.4 | 1335.5 | 1574.7 | 1770.1 | 2018.7 | 2269.7 | 2350.2 | 2330.1 | 2207.0 |
| 60°   | 951.9  | 962.6  | 1017.0 | 1154.4 | 1433.8 | 1667.1 | 1992.7 | 2334.8 | 2473.4 | 2466.2 | 2320.6 |
| 62.5° | 809.8  | 822.9  | 866.7  | 995.7  | 1247.9 | 1548.7 | 1938.2 | 2370.3 | 2589.4 | 2582.3 | 2435.5 |
| 65°   | 696.2  | 697.4  | 741.2  | 848.9  | 1062.0 | 1405.4 | 1842.3 | 2363.2 | 2679.4 | 2684.1 | 2532.5 |
| 67.5° | 582.5  | 579.0  | 635.8  | 723.4  | 910.5  | 1251.5 | 1714.4 | 2300.5 | 2717.3 | 2738.6 | 2564.5 |
| 70°   | 428.6  | 433.3  | 512.7  | 609.8  | 769.6  | 1073.9 | 1535.6 | 2178.5 | 2655.7 | 2688.8 | 2491.1 |
| 72.5° | 322.0  | 331.5  | 408.5  | 509.1  | 642.9  | 896.3  | 1340.3 | 1966.6 | 2484.0 | 2488.7 | 2267.3 |
| 75°   | 261.7  | 264.0  | 332.7  | 422.7  | 526.9  | 718.7  | 1076.2 | 1642.2 | 2100.4 | 2154.9 | 1926.3 |
| 77.5° | 222.6  | 220.2  | 253.4  | 341.0  | 425.1  | 574.2  | 811.0  | 1249.1 | 1649.3 | 1674.2 | 1508.4 |
| 80°   | 189.4  | 188.3  | 200.1  | 275.9  | 332.7  | 409.7  | 555.3  | 870.2  | 1176.9 | 1204.1 | 1071.5 |
| 82.5° | 99.5   | 106.6  | 104.2  | 170.5  | 188.3  | 215.5  | 266.4  | 395.5  | 513.9  | 521.0  | 492.5  |
| 85°   | 4.7    | 4.7    | 4.7    | 7.1    | 11.8   | 18.9   | 36.7   | 36.7   | 40.3   | 77.0   | 87.6   |
| 87.5° | 1.2    | 1.2    | 2.4    | 2.4    | 2.4    | 3.6    | 3.6    | 4.7    | 4.7    | 4.7    | 4.7    |
| 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-HTN-SA1B-840-U-T2U

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 | 1176.9 |
| 2.5°  | 1179.3 | 1174.5 | 1167.4 | 1168.6 | 1167.4 | 1167.4 | 1161.5 | 1156.8 | 1155.6 | 1157.9 | 1162.7 |
| 5°    | 1180.4 | 1173.3 | 1162.7 | 1159.1 | 1155.6 | 1153.2 | 1143.7 | 1136.6 | 1133.1 | 1135.4 | 1136.6 |
| 7.5°  | 1180.4 | 1169.8 | 1157.9 | 1150.8 | 1141.4 | 1134.3 | 1123.6 | 1114.1 | 1109.4 | 1110.6 | 1112.9 |
| 10°   | 1178.1 | 1166.2 | 1156.8 | 1142.5 | 1127.2 | 1118.9 | 1102.3 | 1090.5 | 1084.5 | 1085.7 | 1079.8 |
| 12.5° | 1178.1 | 1165.0 | 1146.1 | 1133.1 | 1111.8 | 1094.0 | 1081.0 | 1068.0 | 1063.2 | 1058.5 | 1056.1 |
| 15°   | 1179.3 | 1162.7 | 1143.7 | 1116.5 | 1091.6 | 1072.7 | 1056.1 | 1047.8 | 1040.7 | 1038.4 | 1039.5 |
| 17.5° | 1179.3 | 1162.7 | 1134.3 | 1102.3 | 1073.9 | 1050.2 | 1036.0 | 1026.5 | 1024.1 | 1021.8 | 1021.8 |
| 20°   | 1185.2 | 1163.9 | 1126.0 | 1088.1 | 1052.6 | 1027.7 | 1014.7 | 1008.8 | 1008.8 | 1005.2 | 1005.2 |
| 22.5° | 1194.6 | 1166.2 | 1121.2 | 1076.2 | 1034.8 | 1007.6 | 993.4  | 986.3  | 989.8  | 987.4  | 986.3  |
| 25°   | 1205.3 | 1174.5 | 1115.3 | 1059.7 | 1011.1 | 982.7  | 968.5  | 963.8  | 962.6  | 956.7  | 965.0  |
| 27.5° | 1213.6 | 1180.4 | 1111.8 | 1043.1 | 989.8  | 956.7  | 938.9  | 930.6  | 924.7  | 927.1  | 924.7  |
| 30°   | 1236.1 | 1197.0 | 1112.9 | 1028.9 | 966.1  | 925.9  | 904.6  | 895.1  | 892.7  | 892.7  | 892.7  |
| 32.5° | 1266.9 | 1218.3 | 1121.2 | 1023.0 | 943.6  | 896.3  | 870.2  | 860.8  | 858.4  | 853.7  | 856.0  |
| 35°   | 1305.9 | 1250.3 | 1134.3 | 1013.5 | 925.9  | 861.9  | 833.5  | 820.5  | 817.0  | 812.2  | 812.2  |
| 37.5° | 1349.7 | 1282.3 | 1143.7 | 1008.8 | 902.2  | 826.4  | 794.5  | 777.9  | 775.5  | 770.8  | 773.1  |
| 40°   | 1405.4 | 1326.1 | 1159.1 | 999.3  | 875.0  | 794.5  | 751.8  | 724.6  | 730.5  | 732.9  | 737.6  |
| 42.5° | 1468.1 | 1381.7 | 1182.8 | 989.8  | 853.7  | 761.3  | 698.6  | 671.3  | 678.4  | 676.1  | 680.8  |
| 45°   | 1553.4 | 1446.8 | 1212.4 | 986.3  | 827.6  | 721.0  | 644.1  | 613.3  | 610.9  | 607.4  | 609.8  |
| 47.5° | 1642.2 | 1525.0 | 1240.8 | 979.2  | 799.2  | 671.3  | 582.5  | 543.5  | 534.0  | 529.2  | 524.5  |
| 50°   | 1734.5 | 1603.1 | 1274.0 | 974.4  | 761.3  | 615.7  | 521.0  | 476.0  | 458.2  | 452.3  | 446.4  |
| 52.5° | 1838.7 | 1687.2 | 1302.4 | 962.6  | 719.9  | 557.7  | 465.3  | 414.4  | 394.3  | 382.4  | 383.6  |
| 55°   | 1948.8 | 1764.1 | 1328.4 | 948.4  | 672.5  | 503.2  | 409.7  | 367.0  | 346.9  | 343.4  | 343.4  |
| 57.5° | 2050.7 | 1843.5 | 1347.4 | 923.5  | 625.1  | 449.9  | 363.5  | 326.8  | 317.3  | 322.0  | 322.0  |
| 60°   | 2154.9 | 1907.4 | 1356.8 | 896.3  | 576.6  | 404.9  | 331.5  | 301.9  | 297.2  | 306.7  | 307.8  |
| 62.5° | 2238.9 | 1958.3 | 1354.5 | 858.4  | 523.3  | 365.9  | 300.7  | 277.1  | 279.4  | 296.0  | 299.5  |
| 65°   | 2299.3 | 1983.2 | 1324.9 | 801.6  | 472.4  | 331.5  | 273.5  | 251.0  | 251.0  | 262.8  | 266.4  |
| 67.5° | 2294.6 | 1951.2 | 1265.7 | 722.2  | 417.9  | 297.2  | 248.6  | 230.9  | 230.9  | 239.2  | 238.0  |
| 70°   | 2197.5 | 1841.1 | 1153.2 | 626.3  | 364.7  | 267.6  | 227.3  | 214.3  | 213.1  | 216.7  | 215.5  |
| 72.5° | 1964.2 | 1617.3 | 978.0  | 517.4  | 314.9  | 238.0  | 206.0  | 194.2  | 191.8  | 187.1  | 183.5  |
| 75°   | 1620.9 | 1328.4 | 763.7  | 412.0  | 266.4  | 209.6  | 185.9  | 175.2  | 165.8  | 171.7  | 168.1  |
| 77.5° | 1257.4 | 1019.4 | 568.3  | 319.7  | 216.7  | 182.3  | 165.8  | 153.9  | 151.6  | 172.9  | 165.8  |
| 80°   | 917.6  | 704.5  | 401.4  | 228.5  | 168.1  | 148.0  | 138.5  | 129.1  | 163.4  | 219.0  | 217.9  |
| 82.5° | 407.3  | 339.8  | 183.5  | 108.9  | 78.1   | 65.1   | 54.5   | 61.6   | 103.0  | 100.6  | 104.2  |
| 85°   | 36.7   | 37.9   | 20.1   | 13.0   | 8.3    | 7.1    | 4.7    | 4.7    | 3.6    | 3.6    | 3.6    |
| 87.5° | 4.7    | 4.7    | 3.6    | 3.6    | 2.4    | 2.4    | 2.4    | 2.4    | 1.2    | 1.2    | 1.2    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Streetworks

Report Number: SP1-2407-157-8

Test Date: 09/05/2024

Luminaire Tested: MEM2-HTN-SA-40-840-U-5WQ

Data in this report applies to families of products including MEM2-HTN-SA-40-840-U-5WQ

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-8  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 09/05/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Streetworks  
 Catalog Number: **MEM2-HTN-SA-40-840-U-5WQ**  
 Description: Epic Modern Light Square 40W 5WQ Optic

**Spectral Parameters**

CCT (K): 3996  
 CIE u': 0.2245  
 CIE v': 0.5031  
 Duv: 0.0012  
 CIE x: 0.3815  
 CIE y: 0.3799  
 CIE z: 0.2386  
 Peak Wavelength (nm): 449  
 Dominant Wavelength (nm): 578  
 Purity: 28.49233  
 Rf: 82.6  
 Rg: 95.1

|           |      |      |      |
|-----------|------|------|------|
| CRI (Ra): | 80.6 |      |      |
| R1:       | 78.1 | R9:  | -5.8 |
| R2:       | 87.1 | R10: | 70.3 |
| R3:       | 94.5 | R11: | 78.7 |
| R4:       | 79.7 | R12: | 60.5 |
| R5:       | 78.7 | R13: | 80.2 |
| R6:       | 82.7 | R14: | 97.2 |
| R7:       | 84.3 | R15: | 70.6 |
| R8:       | 59.5 |      |      |



**Test Conditions**

Stabilization Time: 29M  
 Operation Time: 1H 29M  
 Sphere Temperature (°C): 24.3

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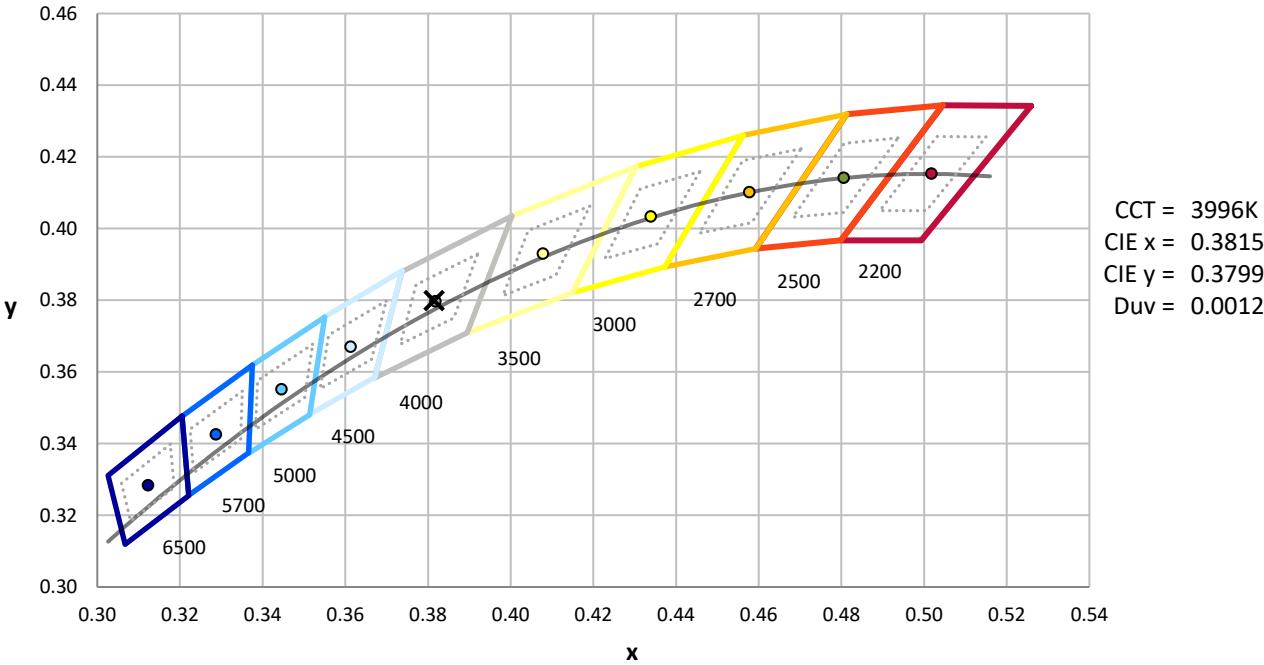
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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 4000K 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               | 289                         | NR                      | 620               | 725                         | NR                      | 750               | 17                          | NR                      | 880               | 0                           | NR                      |
| 365               | 0                           | NR                      | 495               | 351                         | NR                      | 625               | 673                         | NR                      | 755               | 15                          | NR                      | 885               | 0                           | NR                      |
| 370               | 0                           | NR                      | 500               | 414                         | NR                      | 630               | 619                         | NR                      | 760               | 13                          | NR                      | 890               | 0                           | NR                      |
| 375               | 0                           | NR                      | 505               | 470                         | NR                      | 635               | 562                         | NR                      | 765               | 11                          | NR                      | 895               | 0                           | NR                      |
| 380               | 0                           | NR                      | 510               | 513                         | NR                      | 640               | 506                         | NR                      | 770               | 9                           | NR                      | 900               | 0                           | NR                      |
| 385               | 0                           | NR                      | 515               | 546                         | NR                      | 645               | 452                         | NR                      | 775               | 8                           | NR                      | 905               | 0                           | NR                      |
| 390               | 0                           | NR                      | 520               | 571                         | NR                      | 650               | 400                         | NR                      | 780               | 7                           | NR                      | 910               | 0                           | NR                      |
| 395               | 1                           | NR                      | 525               | 592                         | NR                      | 655               | 352                         | NR                      | 785               | 6                           | NR                      | 915               | 0                           | NR                      |
| 400               | 3                           | NR                      | 530               | 606                         | NR                      | 660               | 307                         | NR                      | 790               | 5                           | NR                      | 920               | 0                           | NR                      |
| 405               | 6                           | NR                      | 535               | 624                         | NR                      | 665               | 267                         | NR                      | 795               | 4                           | NR                      | 925               | 0                           | NR                      |
| 410               | 12                          | NR                      | 540               | 642                         | NR                      | 670               | 231                         | NR                      | 800               | 4                           | NR                      | 930               | 0                           | NR                      |
| 415               | 22                          | NR                      | 545               | 663                         | NR                      | 675               | 199                         | NR                      | 805               | 3                           | NR                      | 935               | 0                           | NR                      |
| 420               | 44                          | NR                      | 550               | 686                         | NR                      | 680               | 171                         | NR                      | 810               | 3                           | NR                      | 940               | 0                           | NR                      |
| 425               | 83                          | NR                      | 555               | 713                         | NR                      | 685               | 146                         | NR                      | 815               | 2                           | NR                      | 945               | 0                           | NR                      |
| 430               | 150                         | NR                      | 560               | 745                         | NR                      | 690               | 125                         | NR                      | 820               | 2                           | NR                      | 950               | 0                           | NR                      |
| 435               | 267                         | NR                      | 565               | 774                         | NR                      | 695               | 106                         | NR                      | 825               | 2                           | NR                      | 955               | 0                           | NR                      |
| 440               | 466                         | NR                      | 570               | 806                         | NR                      | 700               | 90                          | NR                      | 830               | 1                           | NR                      | 960               | 0                           | NR                      |
| 445               | 804                         | NR                      | 575               | 835                         | NR                      | 705               | 76                          | NR                      | 835               | 1                           | NR                      | 965               | 0                           | NR                      |
| 450               | 1000                        | NR                      | 580               | 858                         | NR                      | 710               | 65                          | NR                      | 840               | 1                           | NR                      | 970               | 0                           | NR                      |
| 455               | 715                         | NR                      | 585               | 875                         | NR                      | 715               | 55                          | NR                      | 845               | 1                           | NR                      | 975               | 0                           | NR                      |
| 460               | 492                         | NR                      | 590               | 884                         | NR                      | 720               | 47                          | NR                      | 850               | 1                           | NR                      | 980               | 0                           | NR                      |
| 465               | 402                         | NR                      | 595               | 880                         | NR                      | 725               | 40                          | NR                      | 855               | 1                           | NR                      | 985               | 0                           | NR                      |
| 470               | 288                         | NR                      | 600               | 868                         | NR                      | 730               | 34                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 226                         | NR                      | 605               | 844                         | NR                      | 735               | 28                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 227                         | NR                      | 610               | 814                         | NR                      | 740               | 24                          | NR                      | 870               | 0                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 248                         | NR                      | 615               | 771                         | NR                      | 745               | 20                          | NR                      | 875               | 0                           | NR                      |                   |                             |                         |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.66**

| 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    | 289                      | NR            | 620    | 725                      | NR            | 750    | 17                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 351                      | NR            | 625    | 673                      | NR            | 755    | 15                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 414                      | NR            | 630    | 619                      | NR            | 760    | 13                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 470                      | NR            | 635    | 562                      | NR            | 765    | 11                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 513                      | NR            | 640    | 506                      | NR            | 770    | 9                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 546                      | NR            | 645    | 452                      | NR            | 775    | 8                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 571                      | NR            | 650    | 400                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 592                      | NR            | 655    | 352                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 606                      | NR            | 660    | 307                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 6                        | NR            | 535    | 624                      | NR            | 665    | 267                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 12                       | NR            | 540    | 642                      | NR            | 670    | 231                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 22                       | NR            | 545    | 663                      | NR            | 675    | 199                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 44                       | NR            | 550    | 686                      | NR            | 680    | 171                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 83                       | NR            | 555    | 713                      | NR            | 685    | 146                      | NR            | 815    | 2                        | NR            | 945    | 0                        | NR            |
| 430    | 150                      | NR            | 560    | 745                      | NR            | 690    | 125                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 267                      | NR            | 565    | 774                      | NR            | 695    | 106                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 466                      | NR            | 570    | 806                      | NR            | 700    | 90                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 804                      | NR            | 575    | 835                      | NR            | 705    | 76                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 1000                     | NR            | 580    | 858                      | NR            | 710    | 65                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 715                      | NR            | 585    | 875                      | NR            | 715    | 55                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 492                      | NR            | 590    | 884                      | NR            | 720    | 47                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 402                      | NR            | 595    | 880                      | NR            | 725    | 40                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 288                      | NR            | 600    | 868                      | NR            | 730    | 34                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 226                      | NR            | 605    | 844                      | NR            | 735    | 28                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 227                      | NR            | 610    | 814                      | NR            | 740    | 24                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 248                      | NR            | 615    | 771                      | NR            | 745    | 20                       | NR            | 875    | 0                        | NR            |        |                          |               |

REPORT NUMBER: SP1-2407-157-8

Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 3.37

| 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    | 289                      | NR            | 620    | 725                      | NR            | 750    | 17                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 351                      | NR            | 625    | 673                      | NR            | 755    | 15                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 414                      | NR            | 630    | 619                      | NR            | 760    | 13                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 470                      | NR            | 635    | 562                      | NR            | 765    | 11                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 513                      | NR            | 640    | 506                      | NR            | 770    | 9                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 546                      | NR            | 645    | 452                      | NR            | 775    | 8                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 571                      | NR            | 650    | 400                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 592                      | NR            | 655    | 352                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 606                      | NR            | 660    | 307                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 6                        | NR            | 535    | 624                      | NR            | 665    | 267                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 12                       | NR            | 540    | 642                      | NR            | 670    | 231                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 22                       | NR            | 545    | 663                      | NR            | 675    | 199                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 44                       | NR            | 550    | 686                      | NR            | 680    | 171                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 83                       | NR            | 555    | 713                      | NR            | 685    | 146                      | NR            | 815    | 2                        | NR            | 945    | 0                        | NR            |
| 430    | 150                      | NR            | 560    | 745                      | NR            | 690    | 125                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 267                      | NR            | 565    | 774                      | NR            | 695    | 106                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 466                      | NR            | 570    | 806                      | NR            | 700    | 90                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 804                      | NR            | 575    | 835                      | NR            | 705    | 76                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 1000                     | NR            | 580    | 858                      | NR            | 710    | 65                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 715                      | NR            | 585    | 875                      | NR            | 715    | 55                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 492                      | NR            | 590    | 884                      | NR            | 720    | 47                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 402                      | NR            | 595    | 880                      | NR            | 725    | 40                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 288                      | NR            | 600    | 868                      | NR            | 730    | 34                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 226                      | NR            | 605    | 844                      | NR            | 735    | 28                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 227                      | NR            | 610    | 814                      | NR            | 740    | 24                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 248                      | NR            | 615    | 771                      | NR            | 745    | 20                       | NR            | 875    | 0                        | NR            |        |                          |               |

**Summary**

$R_f = 82.6$   
 $R_g = 95.1$   
 CIE  $R_a = 80.6$   
 $R_9 = -5.8$



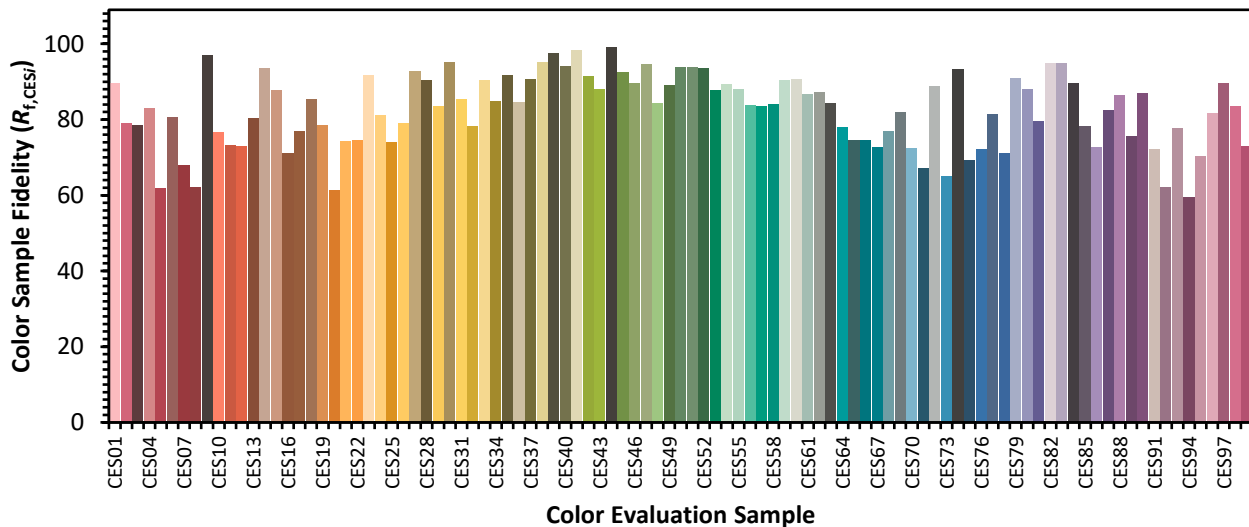
**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 79 | CES51 = 94 | CES76 = 72 |
| CES02 = 61 | CES27 = 93 | CES52 = 94 | CES77 = 82 |
| CES03 = 31 | CES28 = 90 | CES53 = 88 | CES78 = 71 |
| CES04 = 69 | CES29 = 83 | CES54 = 89 | CES79 = 91 |
| CES05 = 48 | CES30 = 95 | CES55 = 88 | CES80 = 88 |
| CES06 = 50 | CES31 = 86 | CES56 = 84 | CES81 = 80 |
| CES07 = 40 | CES32 = 78 | CES57 = 84 | CES82 = 95 |
| CES08 = 39 | CES33 = 90 | CES58 = 84 | CES83 = 95 |
| CES09 = 29 | CES34 = 85 | CES59 = 90 | CES84 = 90 |
| CES10 = 74 | CES35 = 92 | CES60 = 91 | CES85 = 78 |
| CES11 = 57 | CES36 = 85 | CES61 = 87 | CES86 = 73 |
| CES12 = 63 | CES37 = 91 | CES62 = 87 | CES87 = 83 |
| CES13 = 42 | CES38 = 95 | CES63 = 84 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 78 | CES89 = 76 |
| CES15 = 71 | CES40 = 94 | CES65 = 75 | CES90 = 87 |
| CES16 = 46 | CES41 = 98 | CES66 = 75 | CES91 = 72 |
| CES17 = 49 | CES42 = 92 | CES67 = 73 | CES92 = 62 |
| CES18 = 56 | CES43 = 88 | CES68 = 77 | CES93 = 78 |
| CES19 = 71 | CES44 = 99 | CES69 = 82 | CES94 = 60 |
| CES20 = 65 | CES45 = 93 | CES70 = 72 | CES95 = 70 |
| CES21 = 86 | CES46 = 90 | CES71 = 67 | CES96 = 82 |
| CES22 = 78 | CES47 = 95 | CES72 = 89 | CES97 = 90 |
| CES23 = 91 | CES48 = 84 | CES73 = 65 | CES98 = 84 |
| CES24 = 90 | CES49 = 89 | CES74 = 93 | CES99 = 73 |
| CES25 = 71 | CES50 = 94 | CES75 = 69 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)