

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: P868603

Luminaire Tested: **EMM2-HTN-SA2C-730-U-T4W**

Issue Date: 08/22/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P868603  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/22/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: EMM2-HTN-SA2C-730-U-T4W  
Description: EPIC MODERN TALL HOUSING DISCRETE LED ARRAYS 120W 70CRI 3000K  
FIXTURE w/ TYPE IV WIDE DISTRIBUTION OPTIC  
Light Source: (20) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

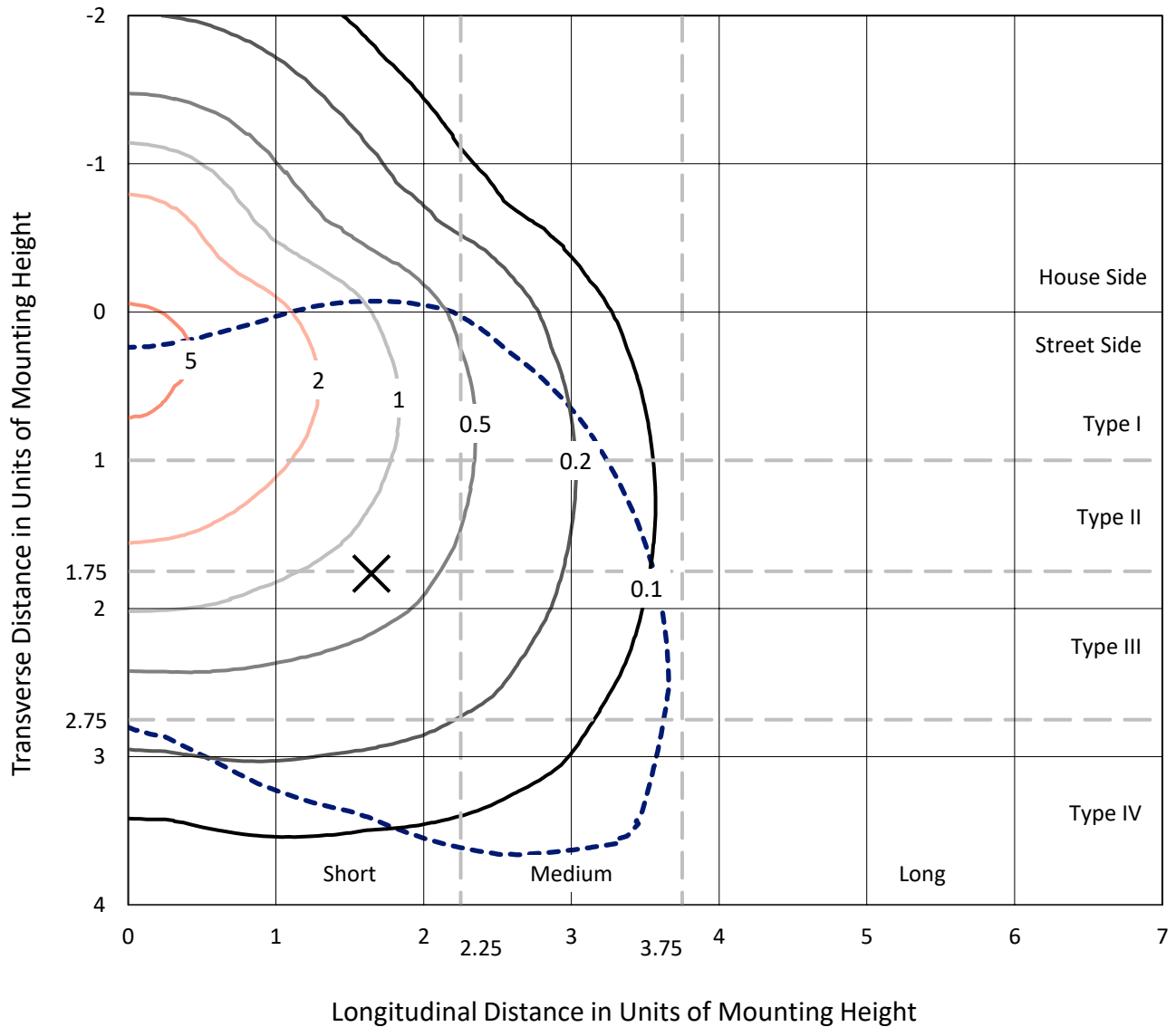
Lumens per Lamp: N/A  
Luminaire Lumens: 12782.3 lumens  
Efficiency: N/A  
Efficacy: 126.6 lumens/watt  
Luminous Opening: Rectangular (W 0.67' x L: 0.33' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G2

Input Watts (W): 101  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): NR  
Voltage Rise (V): NR  
Power Factor: 0.99  
Total Harmonic Distortion (THDi): 9.45%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT

REPORT NUMBER: P868603  
 CATALOG NUMBER: EMM2-HTN-SA2C-730-U-T4W

### Iso-Footcandle Lines of Horizontal Illumination

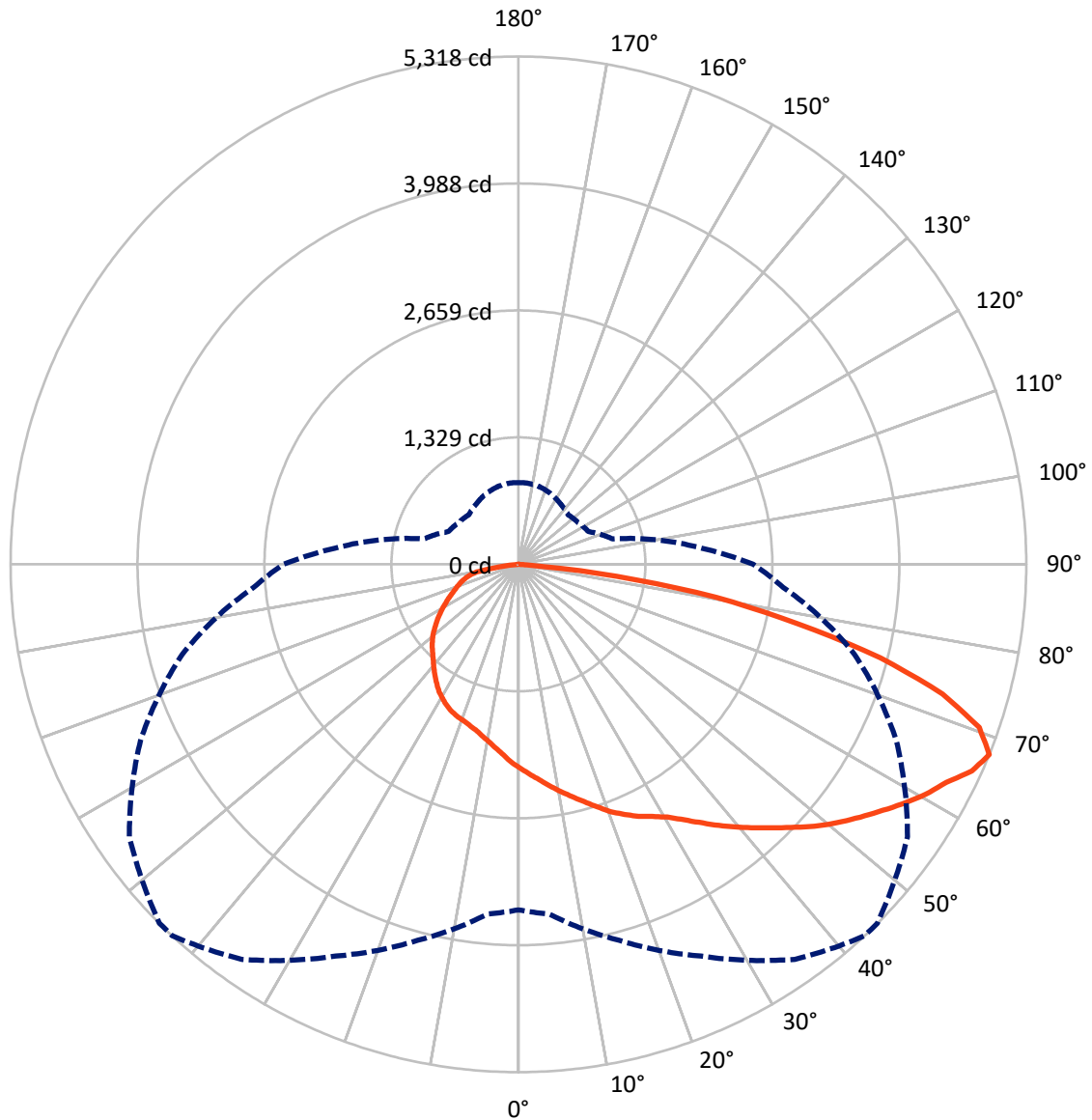
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 6.1 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 43-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3438.5   | 0.0    | 3438.5  |
|                    | % Fixture | 26.9     | 0.0    | 26.9    |
| <b>Street Side</b> | Lumens    | 9343.8   | 0.0    | 9343.8  |
|                    | % Fixture | 73.1     | 0.0    | 73.1    |
| <b>Total</b>       | Lumens    | 12782.3  | 0.0    | 12782.3 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 204.2   | 1.6       |
| 10°-20°   | 623.6   | 4.9       |
| 20°-30°   | 1064.0  | 8.3       |
| 30°-40°   | 1551.8  | 12.1      |
| 40°-50°   | 2084.6  | 16.3      |
| 50°-60°   | 2551.9  | 20.0      |
| 60°-70°   | 2685.7  | 21.0      |
| 70°-80°   | 1753.4  | 13.7      |
| 80°-90°   | 263.0   | 2.1       |
| 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°    | 12782.3 | 100.0     |
| 0°-180°   | 12782.3 | 100.0     |

**Coefficient of Utilization**



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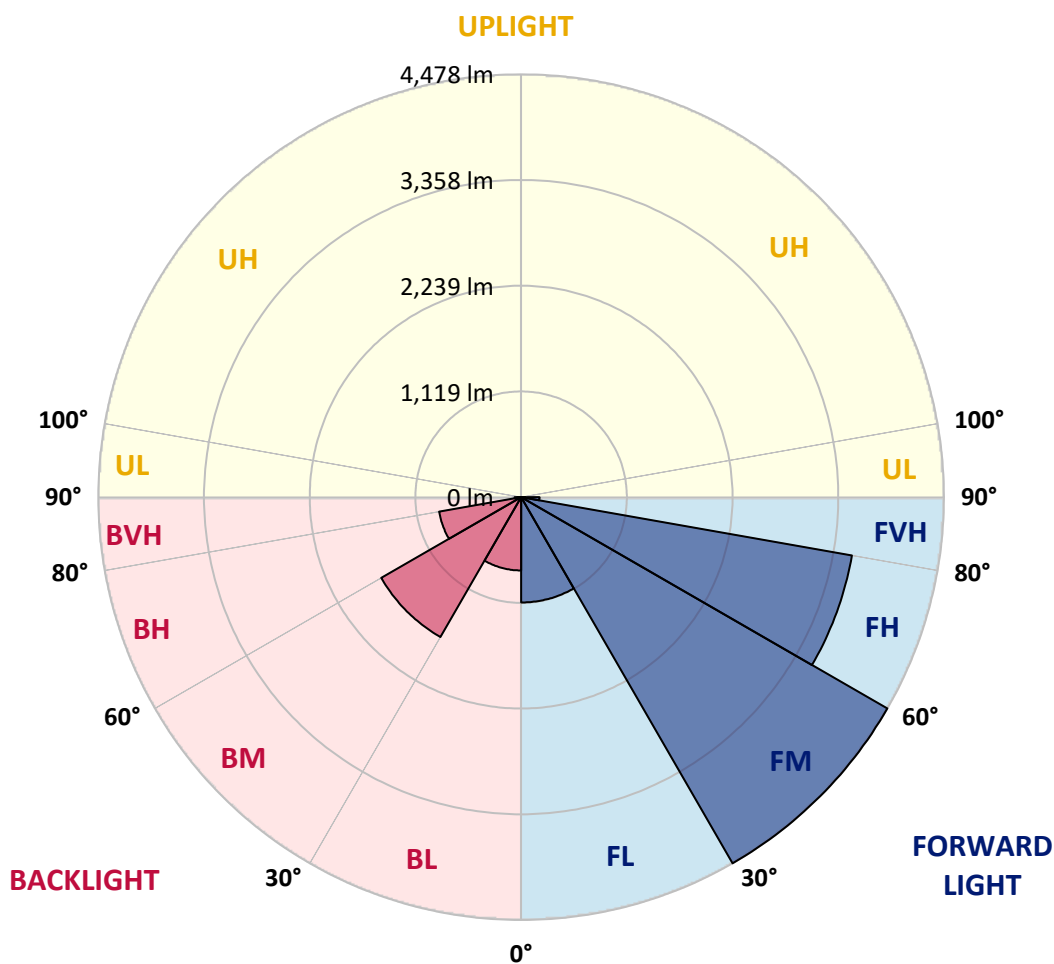
CATALOG NUMBER: EMM2-HTN-SA2C-730-U-T4W

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 1115.5 | 8.7       |                         |      |         |
| FM (30°-60°)   | 4477.6 | 35.0      |                         |      |         |
| FH (60°-80°)   | 3556.7 | 27.8      |                         |      | G2/5000 |
| FVH (80°-90°)  | 194.1  | 1.5       |                         |      | G2/225  |
| BL (0°-30°)    | 776.3  | 6.1       | B2/1000                 |      |         |
| BM (30°-60°)   | 1710.8 | 13.4      | B2/2500                 |      |         |
| BH (60°-80°)   | 882.4  | 6.9       | B2/1000                 |      | G2/1000 |
| BVH (80°-90°)  | 69.0   | 0.5       |                         |      | 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 IV Short





REPORT NUMBER: P868603

CATALOG NUMBER: EMM2-HTN-SA2C-730-U-T4W

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 43°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 |
| 2.5°  | 2232.0 | 2229.5 | 2221.7 | 2216.5 | 2201.0 | 2198.4 | 2198.4 | 2182.9 | 2164.8 | 2154.4 | 2144.1 |
| 5°    | 2332.9 | 2320.0 | 2314.8 | 2304.5 | 2278.6 | 2263.1 | 2268.2 | 2239.8 | 2203.6 | 2177.7 | 2149.3 |
| 7.5°  | 2423.4 | 2418.3 | 2400.2 | 2387.2 | 2356.2 | 2340.7 | 2335.5 | 2291.5 | 2245.0 | 2206.2 | 2159.6 |
| 10°   | 2532.1 | 2519.1 | 2508.8 | 2482.9 | 2441.5 | 2418.3 | 2410.5 | 2353.6 | 2294.1 | 2242.4 | 2180.3 |
| 12.5° | 2630.3 | 2614.8 | 2601.9 | 2576.0 | 2534.6 | 2495.8 | 2485.5 | 2420.8 | 2345.8 | 2276.0 | 2198.4 |
| 15°   | 2705.3 | 2707.9 | 2695.0 | 2671.7 | 2625.2 | 2578.6 | 2570.9 | 2485.5 | 2395.0 | 2309.6 | 2216.5 |
| 17.5° | 2775.2 | 2785.5 | 2777.8 | 2762.2 | 2715.7 | 2669.1 | 2661.4 | 2565.7 | 2457.1 | 2348.4 | 2237.2 |
| 20°   | 2842.4 | 2842.4 | 2839.8 | 2829.5 | 2795.9 | 2764.8 | 2749.3 | 2653.6 | 2516.5 | 2389.8 | 2265.7 |
| 22.5° | 2881.2 | 2891.6 | 2891.6 | 2891.6 | 2870.9 | 2845.0 | 2839.8 | 2746.7 | 2596.7 | 2441.5 | 2291.5 |
| 25°   | 2940.7 | 2953.6 | 2953.6 | 2948.5 | 2930.4 | 2922.6 | 2914.8 | 2826.9 | 2674.3 | 2501.0 | 2320.0 |
| 27.5° | 3067.4 | 3064.8 | 3044.2 | 3018.3 | 2992.4 | 2989.8 | 2979.5 | 2917.4 | 2764.8 | 2565.7 | 2358.8 |
| 30°   | 3243.3 | 3248.5 | 3222.6 | 3142.4 | 3083.0 | 3070.0 | 3072.6 | 3018.3 | 2870.9 | 2640.7 | 2402.7 |
| 32.5° | 3512.3 | 3512.3 | 3411.4 | 3308.0 | 3222.6 | 3189.0 | 3181.2 | 3134.7 | 2979.5 | 2723.4 | 2451.9 |
| 35°   | 3714.0 | 3706.3 | 3649.4 | 3527.8 | 3421.8 | 3326.1 | 3313.1 | 3251.1 | 3101.1 | 2816.6 | 2506.2 |
| 37.5° | 3866.6 | 3882.1 | 3838.2 | 3745.1 | 3641.6 | 3476.1 | 3450.2 | 3362.3 | 3212.3 | 2907.1 | 2560.5 |
| 40°   | 4161.5 | 4122.7 | 4016.6 | 3931.3 | 3807.1 | 3623.5 | 3600.2 | 3491.6 | 3326.1 | 3007.9 | 2627.8 |
| 42.5° | 4376.1 | 4321.8 | 4200.3 | 4086.5 | 3931.3 | 3770.9 | 3750.2 | 3631.3 | 3458.0 | 3121.7 | 2697.6 |
| 45°   | 4683.9 | 4562.4 | 4394.2 | 4293.4 | 4073.5 | 3931.3 | 3905.4 | 3776.1 | 3595.1 | 3243.3 | 2785.5 |
| 47.5° | 4981.4 | 4769.3 | 4590.8 | 4544.3 | 4228.7 | 4104.6 | 4083.9 | 3933.9 | 3742.5 | 3375.2 | 2870.9 |
| 50°   | 4942.6 | 4802.9 | 4743.4 | 4699.4 | 4363.2 | 4267.5 | 4246.8 | 4094.2 | 3892.5 | 3514.9 | 2956.2 |
| 52.5° | 4844.3 | 4857.2 | 4859.8 | 4753.7 | 4489.9 | 4420.1 | 4399.4 | 4267.5 | 4047.7 | 3636.4 | 3039.0 |
| 55°   | 4947.7 | 4963.2 | 4960.7 | 4800.3 | 4637.4 | 4572.7 | 4559.8 | 4443.4 | 4197.7 | 3750.2 | 3098.5 |
| 57.5° | 5105.5 | 5053.8 | 5046.0 | 4916.7 | 4795.1 | 4735.6 | 4720.1 | 4619.3 | 4324.4 | 3833.0 | 3145.0 |
| 60°   | 5133.9 | 5030.5 | 5064.1 | 4942.6 | 4914.1 | 4896.0 | 4890.8 | 4771.9 | 4443.4 | 3900.2 | 3163.1 |
| 62.5° | 4815.8 | 4797.7 | 4929.6 | 4880.5 | 4976.2 | 5027.9 | 5030.5 | 4880.5 | 4508.0 | 3926.1 | 3145.0 |
| 65°   | 4272.7 | 4345.1 | 4629.6 | 4771.9 | 5069.3 | 5216.7 | 5211.5 | 4945.1 | 4500.3 | 3851.1 | 3033.8 |
| 67.5° | 3618.3 | 3675.2 | 4076.1 | 4526.1 | 5048.6 | 5317.6 | 5315.0 | 4973.6 | 4365.8 | 3644.2 | 2782.9 |
| 70°   | 2744.1 | 2922.6 | 3491.6 | 4083.9 | 4769.3 | 5118.4 | 5162.4 | 4813.2 | 4058.0 | 3266.6 | 2402.7 |
| 72.5° | 2087.2 | 2115.7 | 2803.6 | 3424.4 | 4270.1 | 4645.1 | 4637.4 | 4301.1 | 3543.3 | 2751.9 | 2001.9 |
| 75°   | 1482.0 | 1544.1 | 2110.5 | 2653.6 | 3499.4 | 3915.8 | 3897.7 | 3527.8 | 2826.9 | 2141.5 | 1531.1 |
| 77.5° | 1104.4 | 1127.7 | 1544.1 | 1968.2 | 2617.4 | 2992.4 | 2984.7 | 2607.1 | 2079.4 | 1572.5 | 1140.6 |
| 80°   | 806.9  | 845.7  | 1112.1 | 1373.4 | 1774.3 | 2097.5 | 2087.2 | 1730.3 | 1334.6 | 1099.2 | 832.8  |
| 82.5° | 452.6  | 481.1  | 646.6  | 830.2  | 936.3  | 1037.1 | 993.2  | 830.2  | 607.8  | 473.3  | 408.6  |
| 85°   | 12.9   | 15.5   | 23.3   | 28.5   | 49.1   | 82.8   | 90.5   | 80.2   | 95.7   | 59.5   | 64.7   |
| 87.5° | 5.2    | 5.2    | 5.2    | 5.2    | 5.2    | 7.8    | 7.8    | 7.8    | 7.8    | 7.8    | 7.8    |
| 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: P868603

CATALOG NUMBER: EMM2-HTN-SA2C-730-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 | 2133.8 |
| 2.5°  | 2138.9 | 2128.6 | 2107.9 | 2095.0 | 2087.2 | 2076.9 | 2061.3 | 2051.0 | 2043.2 | 2053.6 | 2051.0 |
| 5°    | 2136.3 | 2115.7 | 2079.4 | 2053.6 | 2027.7 | 2007.0 | 1983.7 | 1965.6 | 1955.3 | 1960.5 | 1957.9 |
| 7.5°  | 2136.3 | 2110.5 | 2053.6 | 2012.2 | 1973.4 | 1942.4 | 1916.5 | 1893.2 | 1882.9 | 1885.5 | 1882.9 |
| 10°   | 2146.7 | 2110.5 | 2035.5 | 1976.0 | 1924.3 | 1888.1 | 1859.6 | 1838.9 | 1831.2 | 1838.9 | 1841.5 |
| 12.5° | 2157.0 | 2110.5 | 2020.0 | 1945.0 | 1877.7 | 1838.9 | 1813.0 | 1800.1 | 1805.3 | 1807.9 | 1810.5 |
| 15°   | 2162.2 | 2107.9 | 2004.4 | 1908.7 | 1833.7 | 1792.4 | 1776.8 | 1774.3 | 1787.2 | 1800.1 | 1802.7 |
| 17.5° | 2175.1 | 2105.3 | 1981.2 | 1872.5 | 1794.9 | 1761.3 | 1753.6 | 1763.9 | 1789.8 | 1807.9 | 1813.0 |
| 20°   | 2190.7 | 2110.5 | 1955.3 | 1828.6 | 1756.1 | 1730.3 | 1743.2 | 1766.5 | 1797.5 | 1823.4 | 1828.6 |
| 22.5° | 2206.2 | 2113.1 | 1932.0 | 1789.8 | 1714.8 | 1709.6 | 1738.0 | 1771.7 | 1807.9 | 1833.7 | 1838.9 |
| 25°   | 2224.3 | 2113.1 | 1901.0 | 1740.6 | 1673.4 | 1681.1 | 1725.1 | 1769.1 | 1802.7 | 1836.3 | 1841.5 |
| 27.5° | 2242.4 | 2118.2 | 1867.4 | 1686.3 | 1621.7 | 1644.9 | 1699.2 | 1753.6 | 1789.8 | 1823.4 | 1831.2 |
| 30°   | 2273.4 | 2128.6 | 1838.9 | 1639.8 | 1569.9 | 1601.0 | 1665.6 | 1727.7 | 1766.5 | 1802.7 | 1810.5 |
| 32.5° | 2304.5 | 2144.1 | 1815.6 | 1590.6 | 1518.2 | 1554.4 | 1626.8 | 1696.7 | 1738.0 | 1771.7 | 1776.8 |
| 35°   | 2345.8 | 2164.8 | 1797.5 | 1541.5 | 1466.5 | 1494.9 | 1572.5 | 1650.1 | 1696.7 | 1722.5 | 1735.5 |
| 37.5° | 2389.8 | 2193.2 | 1782.0 | 1497.5 | 1409.6 | 1435.4 | 1518.2 | 1601.0 | 1650.1 | 1676.0 | 1681.1 |
| 40°   | 2444.1 | 2232.0 | 1771.7 | 1456.1 | 1355.3 | 1375.9 | 1458.7 | 1549.2 | 1595.8 | 1613.9 | 1624.2 |
| 42.5° | 2503.6 | 2273.4 | 1763.9 | 1414.7 | 1295.8 | 1316.5 | 1404.4 | 1492.3 | 1538.9 | 1554.4 | 1562.2 |
| 45°   | 2578.6 | 2327.7 | 1758.7 | 1370.8 | 1246.6 | 1264.7 | 1352.7 | 1440.6 | 1479.4 | 1500.1 | 1507.9 |
| 47.5° | 2648.4 | 2382.0 | 1743.2 | 1319.0 | 1192.3 | 1218.2 | 1298.4 | 1375.9 | 1419.9 | 1432.8 | 1440.6 |
| 50°   | 2718.3 | 2428.6 | 1712.2 | 1262.1 | 1143.2 | 1166.5 | 1238.9 | 1295.8 | 1329.4 | 1344.9 | 1350.1 |
| 52.5° | 2785.5 | 2462.2 | 1663.0 | 1202.7 | 1091.4 | 1107.0 | 1166.5 | 1220.8 | 1244.0 | 1249.2 | 1264.7 |
| 55°   | 2829.5 | 2480.3 | 1593.2 | 1132.8 | 1039.7 | 1044.9 | 1088.9 | 1138.0 | 1150.9 | 1153.5 | 1153.5 |
| 57.5° | 2860.5 | 2470.0 | 1510.4 | 1063.0 | 988.0  | 988.0  | 1013.9 | 1052.7 | 1057.8 | 1060.4 | 1065.6 |
| 60°   | 2865.7 | 2433.8 | 1404.4 | 998.3  | 931.1  | 923.3  | 949.2  | 972.5  | 975.1  | 980.2  | 985.4  |
| 62.5° | 2826.9 | 2353.6 | 1290.6 | 936.3  | 876.8  | 858.7  | 882.0  | 905.2  | 918.2  | 925.9  | 931.1  |
| 65°   | 2707.9 | 2190.7 | 1161.3 | 874.2  | 825.1  | 794.0  | 822.5  | 861.3  | 887.1  | 889.7  | 889.7  |
| 67.5° | 2459.6 | 1926.8 | 1024.2 | 809.5  | 763.0  | 734.5  | 770.7  | 812.1  | 843.2  | 856.1  | 853.5  |
| 70°   | 2084.6 | 1634.6 | 897.5  | 742.3  | 700.9  | 682.8  | 721.6  | 768.2  | 794.0  | 804.4  | 809.5  |
| 72.5° | 1678.6 | 1308.7 | 786.3  | 675.0  | 646.6  | 636.2  | 675.0  | 721.6  | 757.8  | 773.3  | 775.9  |
| 75°   | 1306.1 | 1029.4 | 693.1  | 605.2  | 581.9  | 584.5  | 625.9  | 672.5  | 711.3  | 719.0  | 695.7  |
| 77.5° | 1013.9 | 819.9  | 605.2  | 522.4  | 509.5  | 527.6  | 569.0  | 618.1  | 641.4  | 649.2  | 633.7  |
| 80°   | 731.9  | 628.5  | 488.8  | 411.2  | 411.2  | 439.7  | 475.9  | 532.8  | 540.6  | 530.2  | 535.4  |
| 82.5° | 346.6  | 305.2  | 240.5  | 199.2  | 186.2  | 206.9  | 219.8  | 237.9  | 258.6  | 263.8  | 250.9  |
| 85°   | 46.6   | 31.0   | 23.3   | 25.9   | 23.3   | 15.5   | 10.3   | 10.3   | 10.3   | 7.8    | 7.8    |
| 87.5° | 7.8    | 7.8    | 5.2    | 5.2    | 5.2    | 5.2    | 5.2    | 5.2    | 2.6    | 2.6    | 2.6    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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

Report Prepared for

Cooper Lighting Solutions

Streetworks

Report Number: SP1-2407-157-4

Test Date: 08/07/2024

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

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

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/20/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Streetworks  
 Catalog Number: **MEM2-HTN-SA-40-730-U-5WQ-2**  
 Description: Epic Modern Light Square 40W 5WQ Optic and Flare Trim

**Spectral Parameters**

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

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



**Test Conditions**

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

REPORT NUMBER: SP1-2407-157-4

| 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: SP1-2407-157-4

CIE 1931 Chromaticity Diagram



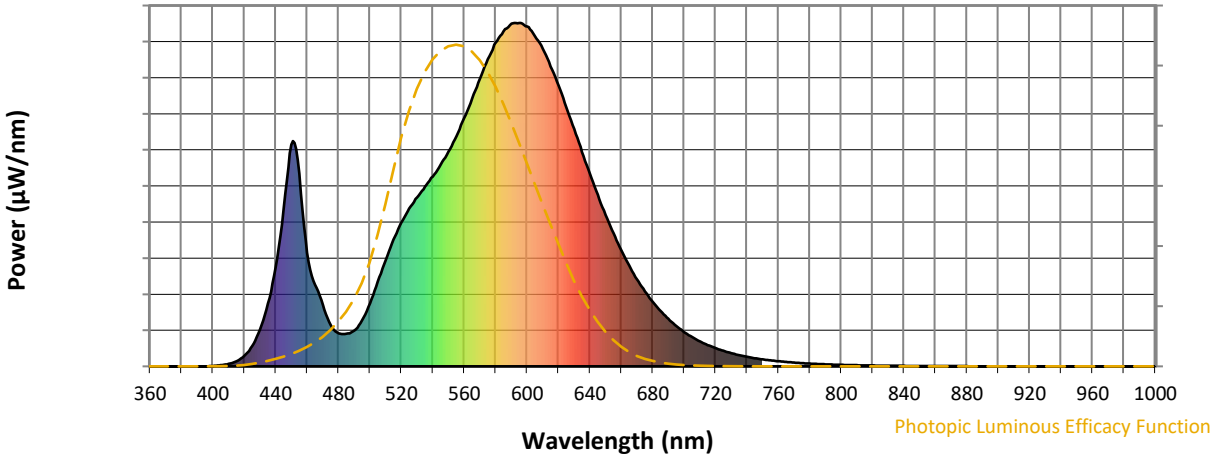
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

REPORT NUMBER: SP1-2407-157-4

**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

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

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**Scotopic Flux vs. Wavelength**



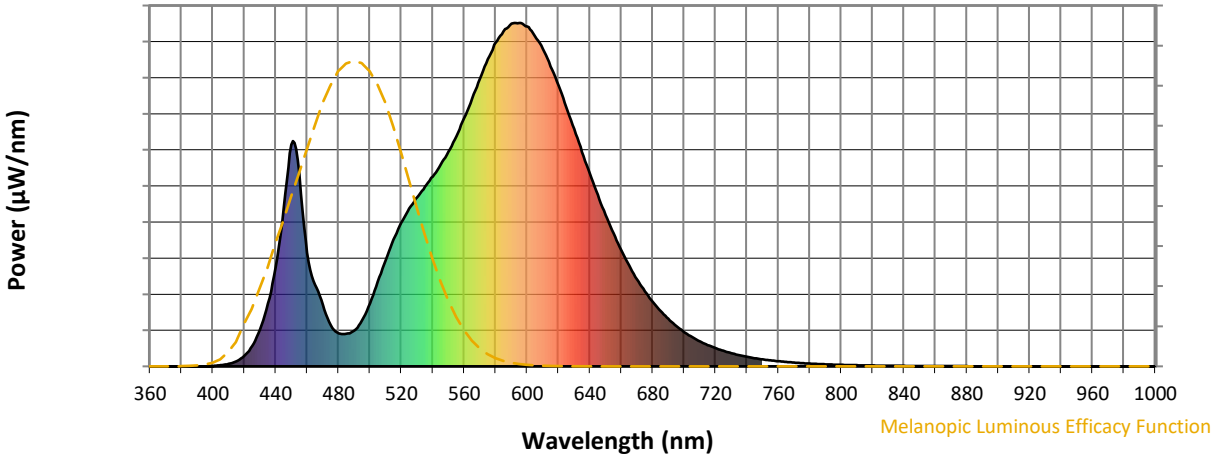
**Scotopic Lumens: NR**

**S/P: 1.23**

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

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Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 2.27

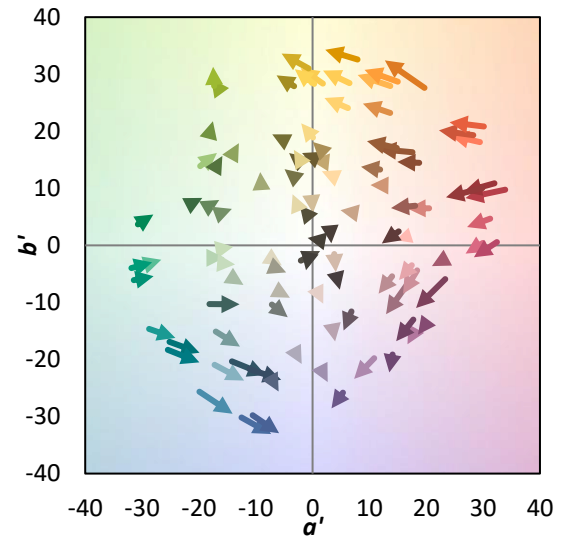
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|-------------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

**Summary**

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



**Color Vector Graphics**





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

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



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)