

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: P870095

Luminaire Tested: **MEM2-HTN-SA-130-840-U-T4W-HSS**

Issue Date: 08/21/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P870095  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/21/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: MEM2-HTN-SA-130-840-U-T4W-HSS  
Description: EPIC MODERN TALL HOUSING DISCRETE LED ARRAYS 130W 80CRI 4000K  
FIXTURE w/ TYPE IV WIDE DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD  
Light Source: (30) 4000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

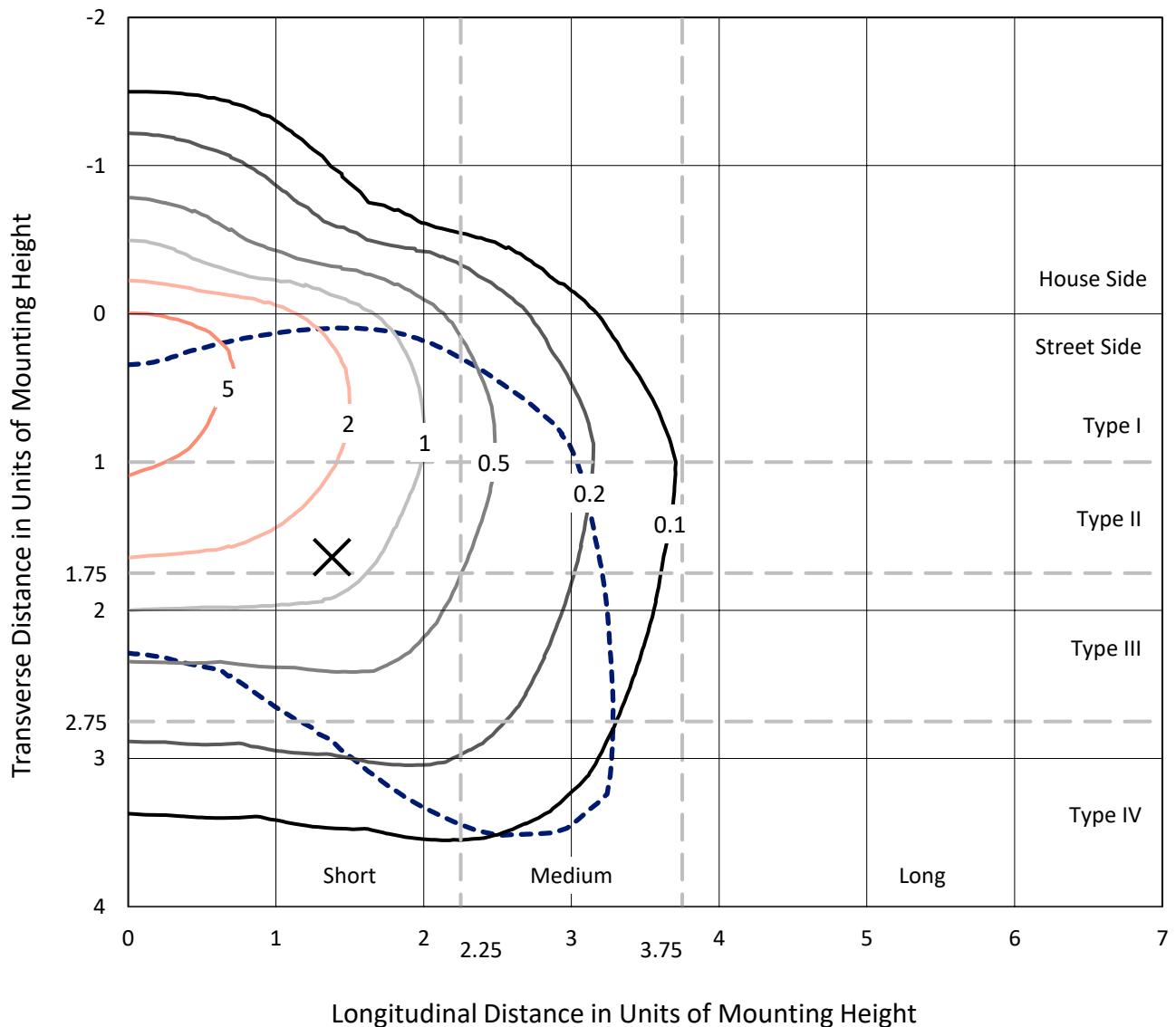
Lumens per Lamp: N/A  
Luminaire Lumens: 12810.3 lumens  
Efficiency: N/A  
Efficacy: 95.6 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.33' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

Input Watts (W): 134  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): NR  
Voltage Rise (V): NR  
Power Factor: 0.99  
Total Harmonic Distortion (THDi): 6.70%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT

REPORT NUMBER: P870095  
 CATALOG NUMBER: MEM2-HTN-SA-130-840-U-T4W-HSS

### Iso-Footcandle Lines of Horizontal Illumination

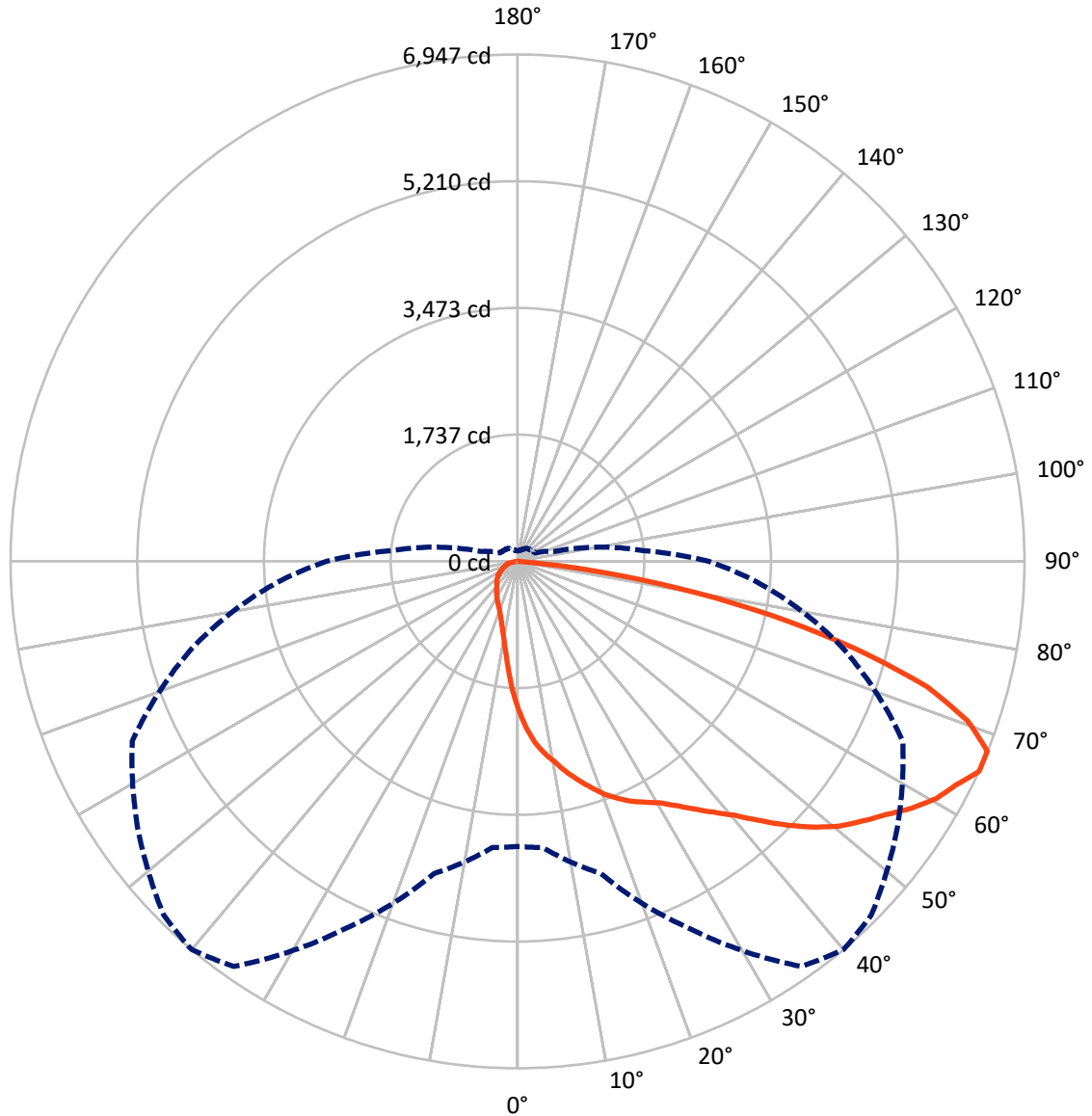
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 7.4 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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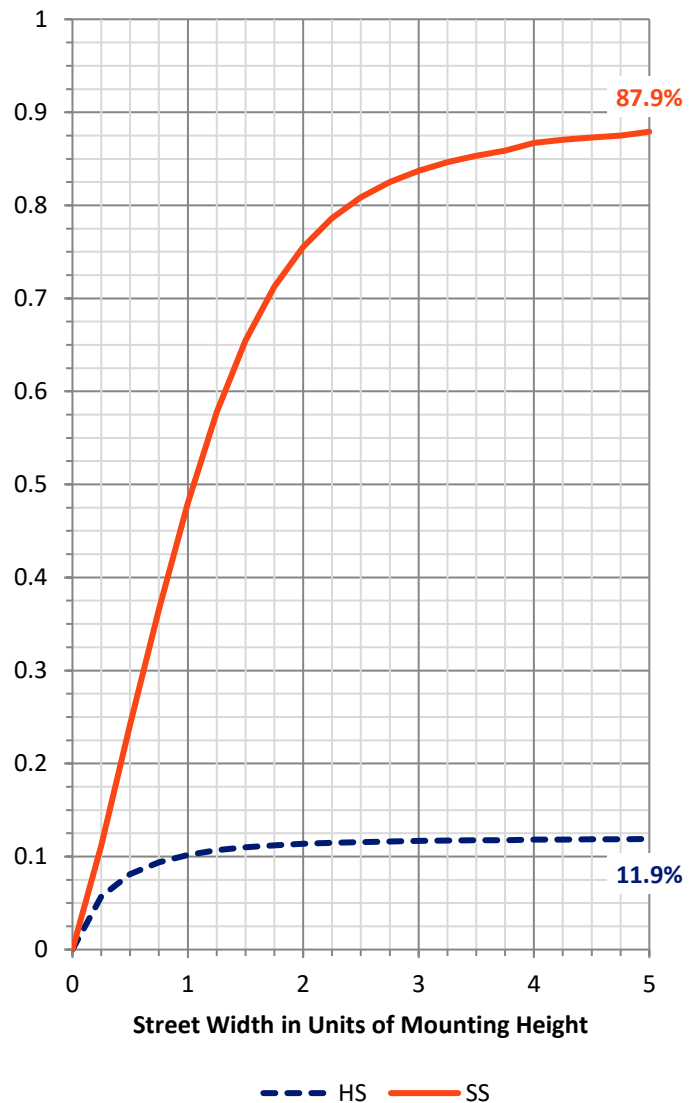
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1533.7   | 0.0    | 1533.7  |
|                    | % Fixture | 12.0     | 0.0    | 12.0    |
| <b>Street Side</b> | Lumens    | 11276.6  | 0.0    | 11276.6 |
|                    | % Fixture | 88.0     | 0.0    | 88.0    |
| <b>Total</b>       | Lumens    | 12810.3  | 0.0    | 12810.3 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 190.6   | 1.5       |
| 10°-20°   | 573.2   | 4.5       |
| 20°-30°   | 985.9   | 7.7       |
| 30°-40°   | 1490.4  | 11.6      |
| 40°-50°   | 2179.3  | 17.0      |
| 50°-60°   | 2783.5  | 21.7      |
| 60°-70°   | 2777.9  | 21.7      |
| 70°-80°   | 1628.9  | 12.7      |
| 80°-90°   | 200.7   | 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°    | 12810.3 | 100.0     |
| 0°-180°   | 12810.3 | 100.0     |



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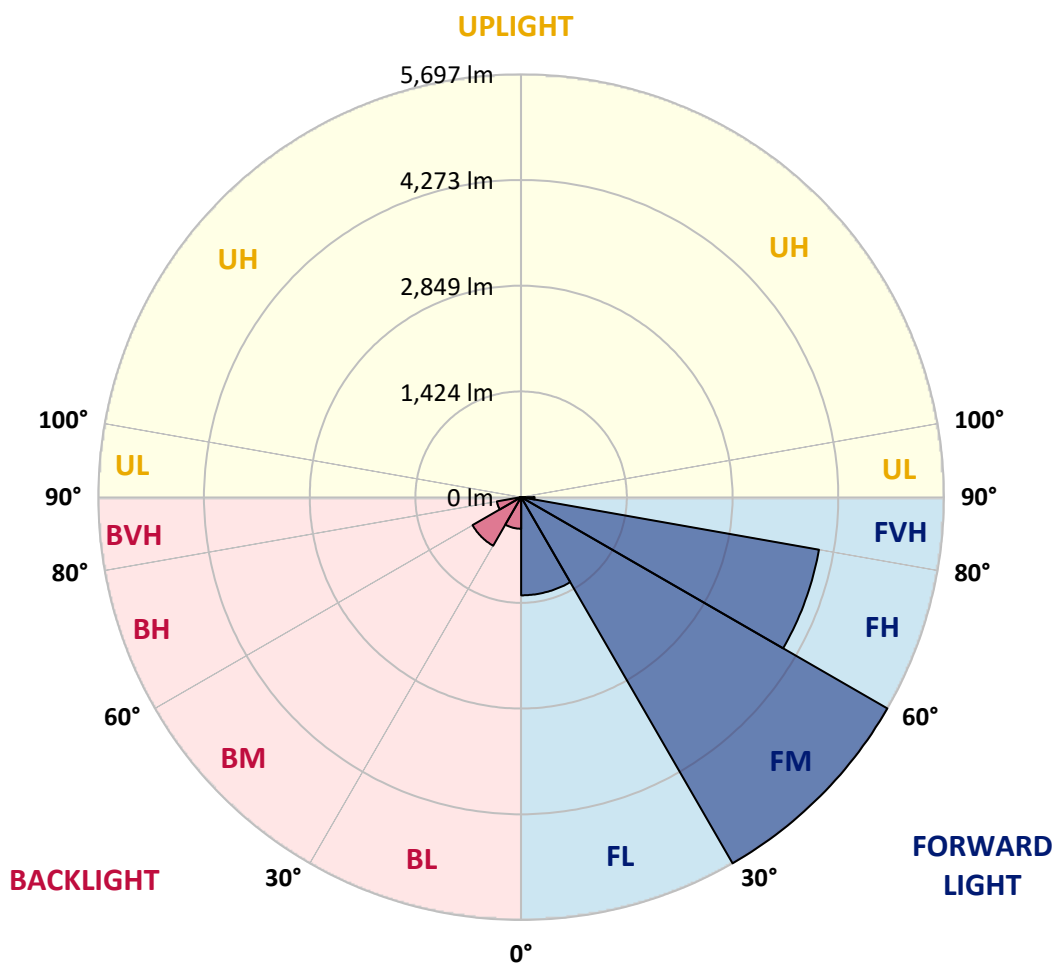
CATALOG NUMBER: MEM2-HTN-SA-130-840-U-T4W-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1323.1 | 10.3      |                         |      |         |
| FM   | (30°-60°)   | 5697.4 | 44.5      |                         |      |         |
| FH   | (60°-80°)   | 4074.7 | 31.8      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 181.3  | 1.4       |                         |      | G2/225  |
| BL   | (0°-30°)    | 426.6  | 3.3       | B1/500                  |      |         |
| BM   | (30°-60°)   | 755.7  | 5.9       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 332.0  | 2.6       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 19.3   | 0.2       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type IV Short





REPORT NUMBER: P870095

CATALOG NUMBER: MEM2-HTN-SA-130-840-U-T4W-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 40°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 |
| 2.5°  | 2375.7 | 2364.8 | 2343.2 | 2325.1 | 2299.9 | 2278.2 | 2256.5 | 2216.8 | 2166.3 | 2122.9 | 2068.8 |
| 5°    | 2610.4 | 2592.3 | 2577.9 | 2556.2 | 2512.9 | 2494.8 | 2480.4 | 2397.3 | 2310.7 | 2220.4 | 2101.3 |
| 7.5°  | 2776.4 | 2790.9 | 2762.0 | 2729.5 | 2675.3 | 2653.7 | 2632.0 | 2549.0 | 2440.7 | 2310.7 | 2141.0 |
| 10°   | 2967.8 | 2971.4 | 2935.3 | 2895.6 | 2837.8 | 2794.5 | 2765.6 | 2664.5 | 2545.4 | 2401.0 | 2184.3 |
| 12.5° | 3151.9 | 3151.9 | 3130.3 | 3072.5 | 2996.7 | 2957.0 | 2906.4 | 2790.9 | 2646.5 | 2476.8 | 2234.9 |
| 15°   | 3300.0 | 3307.2 | 3289.1 | 3245.8 | 3162.8 | 3108.6 | 3058.1 | 2924.5 | 2740.3 | 2563.4 | 2274.6 |
| 17.5° | 3433.5 | 3429.9 | 3419.1 | 3379.4 | 3300.0 | 3256.6 | 3206.1 | 3058.1 | 2848.6 | 2632.0 | 2336.0 |
| 20°   | 3523.8 | 3523.8 | 3520.2 | 3498.5 | 3440.8 | 3408.3 | 3346.9 | 3191.6 | 2967.8 | 2733.1 | 2401.0 |
| 22.5° | 3592.4 | 3588.8 | 3588.8 | 3592.4 | 3559.9 | 3527.4 | 3502.1 | 3346.9 | 3090.5 | 2819.8 | 2465.9 |
| 25°   | 3650.2 | 3646.6 | 3657.4 | 3664.6 | 3650.2 | 3642.9 | 3614.1 | 3494.9 | 3242.2 | 2920.9 | 2530.9 |
| 27.5° | 3726.0 | 3736.8 | 3733.2 | 3733.2 | 3729.6 | 3736.8 | 3733.2 | 3632.1 | 3390.2 | 3029.2 | 2599.5 |
| 30°   | 3845.1 | 3863.2 | 3852.4 | 3837.9 | 3837.9 | 3841.5 | 3859.6 | 3794.6 | 3563.5 | 3162.8 | 2675.3 |
| 32.5° | 4123.1 | 4105.1 | 4029.3 | 3978.7 | 3985.9 | 3989.6 | 4007.6 | 3971.5 | 3736.8 | 3314.4 | 2754.8 |
| 35°   | 4440.9 | 4419.2 | 4336.2 | 4220.6 | 4180.9 | 4166.5 | 4162.9 | 4141.2 | 3924.6 | 3476.9 | 2848.6 |
| 37.5° | 4852.4 | 4859.7 | 4736.9 | 4570.8 | 4451.7 | 4361.4 | 4343.4 | 4296.4 | 4087.0 | 3624.9 | 2946.1 |
| 40°   | 5271.3 | 5242.4 | 5137.7 | 4975.2 | 4740.5 | 4574.4 | 4520.3 | 4455.3 | 4271.2 | 3780.1 | 3040.0 |
| 42.5° | 5675.6 | 5621.5 | 5484.3 | 5307.4 | 5033.0 | 4852.4 | 4729.7 | 4646.7 | 4440.9 | 3949.8 | 3130.3 |
| 45°   | 6202.8 | 6047.5 | 5802.0 | 5643.1 | 5300.1 | 5152.1 | 5040.2 | 4856.1 | 4643.0 | 4119.5 | 3238.6 |
| 47.5° | 6618.0 | 6318.3 | 6094.4 | 6025.8 | 5578.2 | 5441.0 | 5339.9 | 5083.5 | 4848.8 | 4310.9 | 3350.5 |
| 50°   | 6542.1 | 6358.0 | 6303.9 | 6242.5 | 5787.6 | 5704.5 | 5610.6 | 5343.5 | 5058.2 | 4513.1 | 3458.8 |
| 52.5° | 6347.2 | 6368.8 | 6437.4 | 6332.7 | 5971.7 | 5913.9 | 5852.5 | 5621.5 | 5267.7 | 4679.1 | 3556.3 |
| 55°   | 6191.9 | 6235.3 | 6419.4 | 6386.9 | 6191.9 | 6126.9 | 6083.6 | 5895.9 | 5469.8 | 4830.8 | 3639.3 |
| 57.5° | 5910.3 | 5874.2 | 6105.3 | 6480.8 | 6426.6 | 6376.1 | 6332.7 | 6184.7 | 5675.6 | 4939.1 | 3693.5 |
| 60°   | 5466.2 | 5332.6 | 5643.1 | 6365.2 | 6589.1 | 6596.3 | 6571.0 | 6401.3 | 5841.7 | 4939.1 | 3664.6 |
| 62.5° | 4841.6 | 4715.3 | 5098.0 | 5978.9 | 6675.7 | 6744.3 | 6729.9 | 6477.2 | 5913.9 | 4830.8 | 3552.7 |
| 65°   | 3906.5 | 3935.4 | 4430.0 | 5542.0 | 6776.8 | 6946.5 | 6856.3 | 6354.4 | 5823.7 | 4621.4 | 3300.0 |
| 67.5° | 3119.4 | 3206.1 | 3650.2 | 4975.2 | 6729.9 | 6942.9 | 6816.5 | 6007.8 | 5437.3 | 4328.9 | 2913.6 |
| 70°   | 2462.3 | 2520.1 | 2888.4 | 4209.8 | 6318.3 | 6542.1 | 6383.3 | 5477.1 | 4783.9 | 3877.6 | 2422.6 |
| 72.5° | 1924.4 | 1978.5 | 2292.6 | 3368.6 | 5603.4 | 5863.4 | 5664.8 | 4762.2 | 3967.9 | 3289.1 | 1924.4 |
| 75°   | 1462.2 | 1501.9 | 1736.6 | 2595.9 | 4462.5 | 4787.5 | 4643.0 | 3812.6 | 3097.8 | 2603.1 | 1473.1 |
| 77.5° | 942.3  | 996.5  | 1260.0 | 1819.7 | 3151.9 | 3541.9 | 3559.9 | 2848.6 | 2227.6 | 1881.0 | 1083.1 |
| 80°   | 624.6  | 646.3  | 808.7  | 1184.2 | 1938.8 | 2242.1 | 2346.8 | 1924.4 | 1422.5 | 1198.7 | 779.9  |
| 82.5° | 260.0  | 288.8  | 386.3  | 595.7  | 971.2  | 974.8  | 1115.6 | 812.4  | 577.7  | 509.1  | 328.6  |
| 85°   | 7.2    | 14.4   | 10.8   | 28.9   | 25.3   | 39.7   | 46.9   | 65.0   | 46.9   | 50.5   | 50.5   |
| 87.5° | 0.0    | 0.0    | 3.6    | 3.6    | 7.2    | 7.2    | 7.2    | 7.2    | 7.2    | 10.8   | 7.2    |
| 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: P870095

CATALOG NUMBER: MEM2-HTN-SA-130-840-U-T4W-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 | 2036.3 |
| 2.5°  | 2043.5 | 2011.0 | 1946.0 | 1895.5 | 1841.3 | 1801.6 | 1765.5 | 1725.8 | 1700.5 | 1704.1 | 1678.9 |
| 5°    | 2043.5 | 1982.1 | 1852.2 | 1736.6 | 1631.9 | 1556.1 | 1473.1 | 1408.1 | 1361.1 | 1353.9 | 1375.6 |
| 7.5°  | 2054.3 | 1953.3 | 1758.3 | 1585.0 | 1440.6 | 1321.4 | 1234.8 | 1169.8 | 1137.3 | 1115.6 | 1112.0 |
| 10°   | 2065.2 | 1931.6 | 1671.6 | 1451.4 | 1270.9 | 1140.9 | 1065.1 | 992.9  | 956.8  | 953.2  | 942.3  |
| 12.5° | 2072.4 | 1906.3 | 1592.2 | 1317.8 | 1130.1 | 1007.3 | 931.5  | 873.7  | 844.8  | 844.8  | 841.2  |
| 15°   | 2097.7 | 1899.1 | 1509.2 | 1216.7 | 1021.8 | 902.6  | 837.6  | 790.7  | 772.6  | 761.8  | 758.2  |
| 17.5° | 2119.3 | 1884.7 | 1437.0 | 1115.6 | 924.3  | 819.6  | 758.2  | 725.7  | 707.6  | 700.4  | 696.8  |
| 20°   | 2151.8 | 1877.4 | 1368.4 | 1032.6 | 852.1  | 751.0  | 704.0  | 675.2  | 664.3  | 657.1  | 657.1  |
| 22.5° | 2184.3 | 1870.2 | 1299.8 | 960.4  | 790.7  | 700.4  | 657.1  | 631.8  | 621.0  | 617.4  | 613.8  |
| 25°   | 2224.0 | 1866.6 | 1242.0 | 899.0  | 736.5  | 660.7  | 621.0  | 599.3  | 584.9  | 577.7  | 577.7  |
| 27.5° | 2263.8 | 1870.2 | 1184.2 | 837.6  | 689.6  | 624.6  | 584.9  | 559.6  | 548.8  | 534.3  | 538.0  |
| 30°   | 2317.9 | 1873.8 | 1137.3 | 787.1  | 649.9  | 588.5  | 552.4  | 519.9  | 505.5  | 498.2  | 498.2  |
| 32.5° | 2372.1 | 1888.3 | 1090.4 | 740.1  | 610.2  | 559.6  | 516.3  | 487.4  | 469.4  | 465.7  | 462.1  |
| 35°   | 2429.8 | 1899.1 | 1047.0 | 700.4  | 577.7  | 527.1  | 483.8  | 454.9  | 440.5  | 436.9  | 436.9  |
| 37.5° | 2494.8 | 1917.2 | 1014.5 | 664.3  | 545.2  | 494.6  | 454.9  | 426.0  | 415.2  | 411.6  | 411.6  |
| 40°   | 2563.4 | 1946.0 | 989.3  | 631.8  | 519.9  | 465.7  | 429.6  | 404.4  | 397.1  | 393.5  | 393.5  |
| 42.5° | 2632.0 | 1971.3 | 967.6  | 606.6  | 494.6  | 440.5  | 411.6  | 386.3  | 375.5  | 375.5  | 375.5  |
| 45°   | 2697.0 | 1989.4 | 945.9  | 581.3  | 469.4  | 422.4  | 389.9  | 368.3  | 357.4  | 357.4  | 357.4  |
| 47.5° | 2754.8 | 2007.4 | 913.4  | 556.0  | 444.1  | 397.1  | 371.9  | 350.2  | 339.4  | 339.4  | 339.4  |
| 50°   | 2816.2 | 2018.2 | 877.3  | 523.5  | 418.8  | 379.1  | 353.8  | 328.6  | 321.3  | 317.7  | 317.7  |
| 52.5° | 2866.7 | 2018.2 | 830.4  | 491.0  | 389.9  | 353.8  | 332.2  | 310.5  | 299.7  | 292.4  | 292.4  |
| 55°   | 2902.8 | 2018.2 | 779.9  | 451.3  | 361.0  | 332.2  | 310.5  | 288.8  | 274.4  | 263.6  | 263.6  |
| 57.5° | 2924.5 | 2007.4 | 722.1  | 404.4  | 332.2  | 303.3  | 288.8  | 263.6  | 234.7  | 213.0  | 205.8  |
| 60°   | 2906.4 | 1974.9 | 660.7  | 353.8  | 299.7  | 278.0  | 267.2  | 234.7  | 195.0  | 184.1  | 184.1  |
| 62.5° | 2830.6 | 1899.1 | 599.3  | 310.5  | 274.4  | 252.7  | 241.9  | 205.8  | 176.9  | 166.1  | 166.1  |
| 65°   | 2617.6 | 1715.0 | 523.5  | 270.8  | 245.5  | 231.1  | 216.6  | 184.1  | 158.9  | 144.4  | 144.4  |
| 67.5° | 2307.1 | 1480.3 | 436.9  | 238.3  | 220.2  | 209.4  | 198.6  | 166.1  | 140.8  | 126.4  | 126.4  |
| 70°   | 1870.2 | 1195.1 | 371.9  | 209.4  | 195.0  | 187.7  | 176.9  | 151.6  | 122.8  | 111.9  | 111.9  |
| 72.5° | 1469.5 | 938.7  | 310.5  | 187.7  | 180.5  | 166.1  | 158.9  | 133.6  | 111.9  | 101.1  | 101.1  |
| 75°   | 1094.0 | 700.4  | 274.4  | 166.1  | 166.1  | 148.0  | 144.4  | 119.1  | 97.5   | 90.3   | 90.3   |
| 77.5° | 805.1  | 519.9  | 238.3  | 144.4  | 144.4  | 130.0  | 122.8  | 104.7  | 90.3   | 83.0   | 83.0   |
| 80°   | 545.2  | 353.8  | 176.9  | 108.3  | 108.3  | 104.7  | 97.5   | 90.3   | 75.8   | 68.6   | 65.0   |
| 82.5° | 231.1  | 148.0  | 86.7   | 54.2   | 50.5   | 39.7   | 32.5   | 25.3   | 25.3   | 21.7   | 21.7   |
| 85°   | 39.7   | 18.1   | 18.1   | 14.4   | 10.8   | 10.8   | 10.8   | 7.2    | 7.2    | 7.2    | 7.2    |
| 87.5° | 7.2    | 7.2    | 7.2    | 7.2    | 7.2    | 7.2    | 3.6    | 3.6    | 3.6    | 3.6    | 3.6    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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-30-840-U-5WQ

Data in this report applies to families of products including MEM2-HTN-SA-30-840-U-5WQ

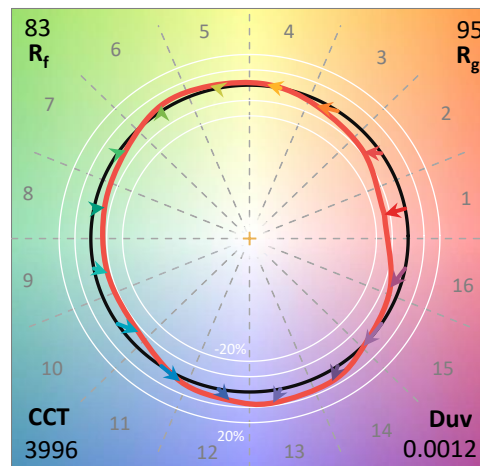
**Test Information**

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-30-840-U-5WQ**  
 Description: Epic Modern Light Square 30W 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

REPORT NUMBER: SP1-2407-157-8

| 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: SP1-2407-157-8

**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

REPORT NUMBER: SP1-2407-157-8

**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                      |                   |                             |                         |

REPORT NUMBER: SP1-2407-157-8

**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



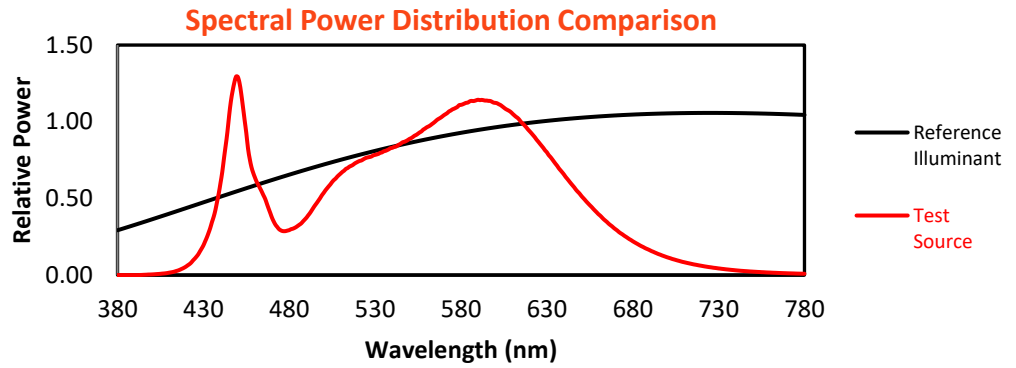
Melanopic Lumens: NR

M/P: 3.37

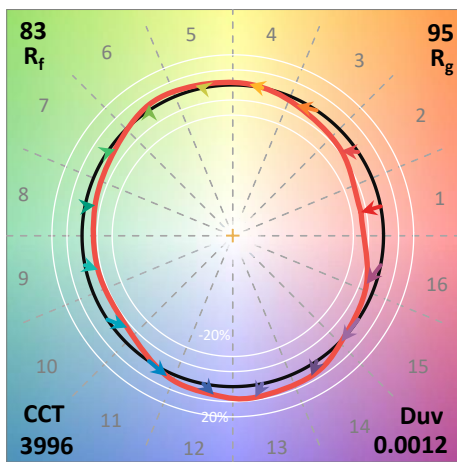
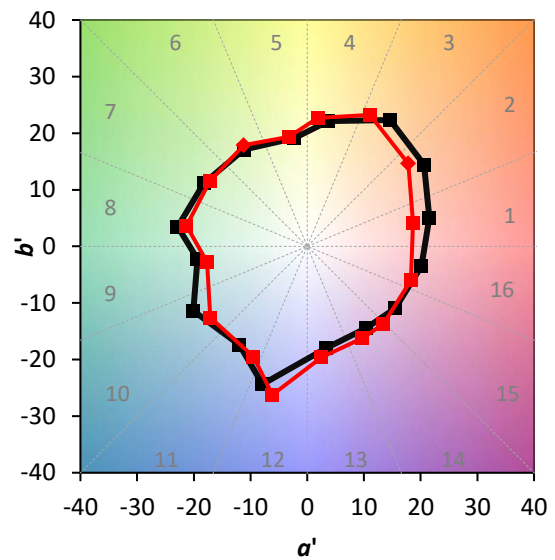
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 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  $R_a = 80.6$   
 $R_9 = -5.8$



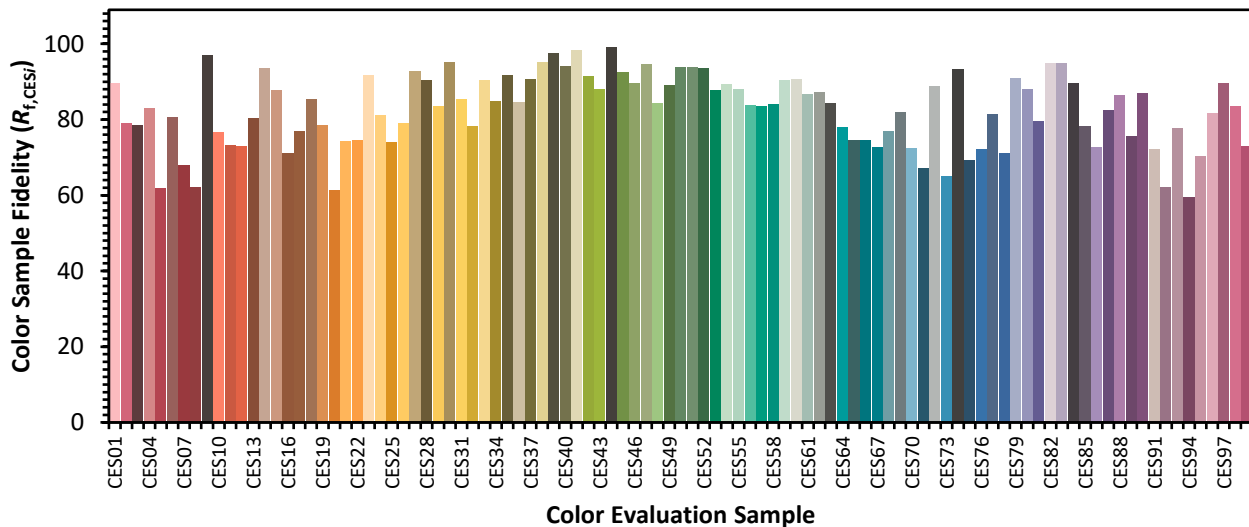
**Color Vector Graphics**





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)