

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: P868119

Luminaire Tested: **MEM2-HSN-SA-130-740-U-T4W**

Issue Date: 08/21/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P868119  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/21/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: MEM2-HSN-SA-130-740-U-T4W  
Description: EPIC MODERN SHORT HOUSING DISCRETE LED ARRAYS 130W 70CRI 4000K  
FITXURE w/ TYPE IV WIDE DISTRIBUTION OPTIC  
Light Source: (30) 4000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

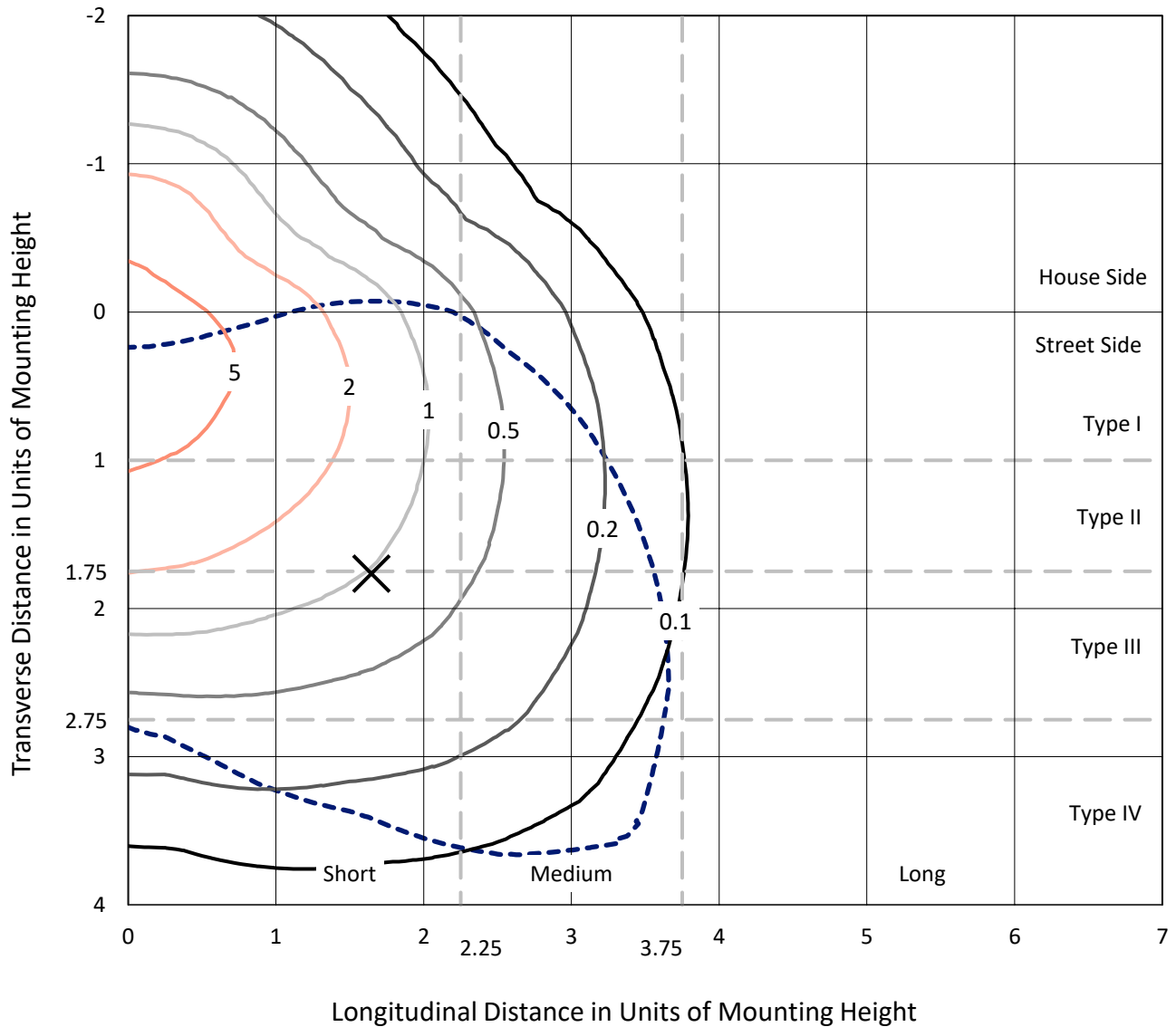
Lumens per Lamp: N/A  
Luminaire Lumens: 16631.9 lumens  
Efficiency: N/A  
Efficacy: 147.2 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.33' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G3

Input Watts (W): 113  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): NR  
Voltage Rise (V): NR  
Power Factor: 0.99  
Total Harmonic Distortion (THDi): 7.77%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT

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 CATALOG NUMBER: MEM2-HSN-SA-130-740-U-T4W

### Iso-Footcandle Lines of Horizontal Illumination

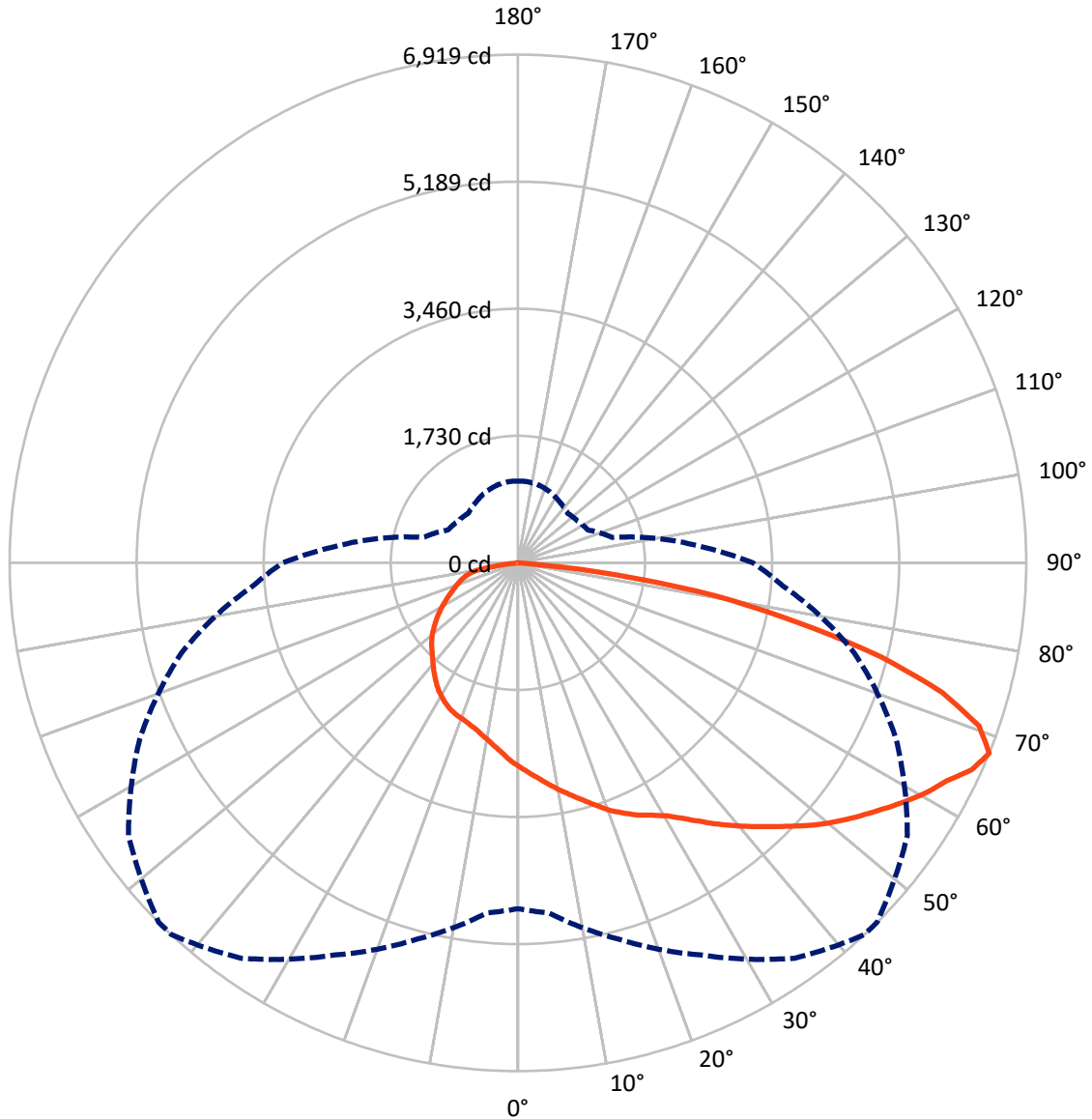
✕ Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 7.9 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    | 4474.0   | 0.0    | 4474.0  |
|                    | % Fixture | 26.9     | 0.0    | 26.9    |
| <b>Street Side</b> | Lumens    | 12157.9  | 0.0    | 12157.9 |
|                    | % Fixture | 73.1     | 0.0    | 73.1    |
| <b>Total</b>       | Lumens    | 16631.9  | 0.0    | 16631.9 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 265.7   | 1.6       |
| 10°-20°   | 811.4   | 4.9       |
| 20°-30°   | 1384.4  | 8.3       |
| 30°-40°   | 2019.1  | 12.1      |
| 40°-50°   | 2712.5  | 16.3      |
| 50°-60°   | 3320.5  | 20.0      |
| 60°-70°   | 3494.6  | 21.0      |
| 70°-80°   | 2281.5  | 13.7      |
| 80°-90°   | 342.2   | 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°    | 16631.9 | 100.0     |
| 0°-180°   | 16631.9 | 100.0     |



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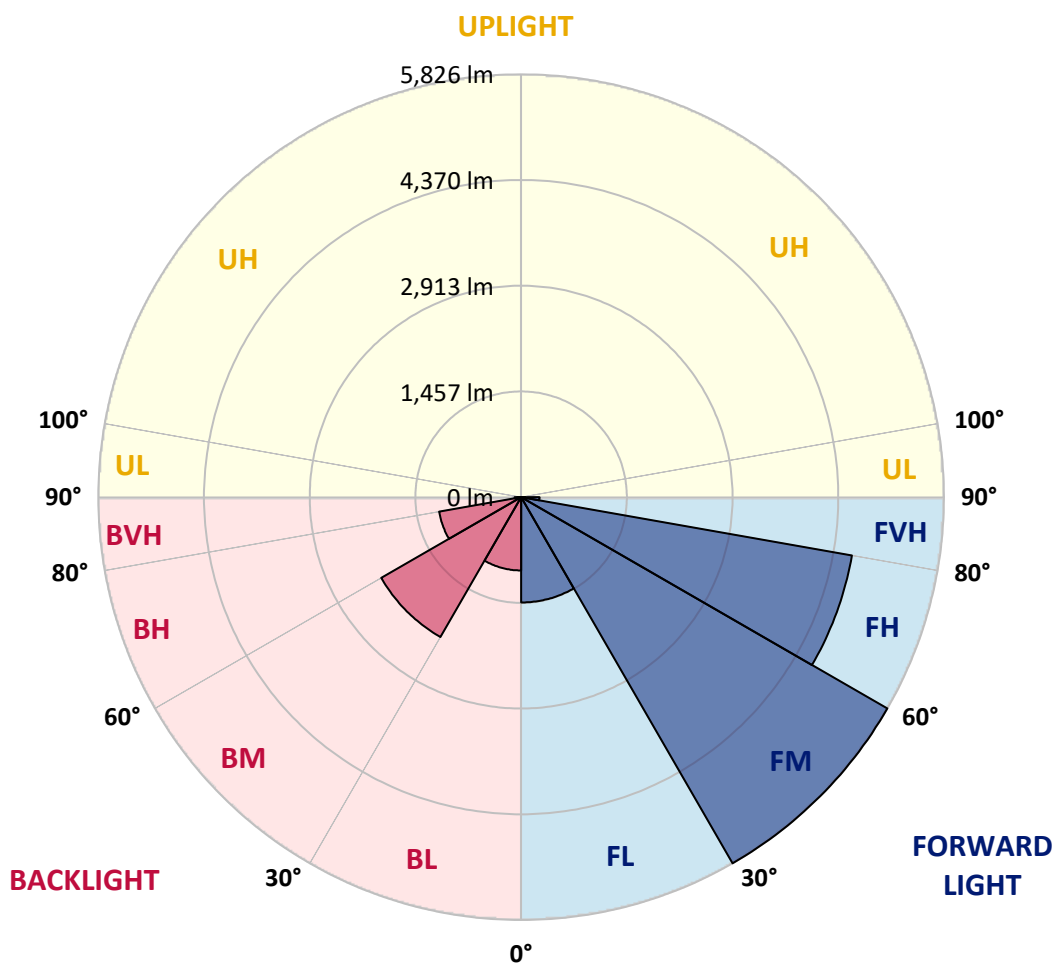
CATALOG NUMBER: MEM2-HSN-SA-130-740-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1451.5 | 8.7       |                         |      |         |
| FM   | (30°-60°)   | 5826.0 | 35.0      |                         |      |         |
| FH   | (60°-80°)   | 4627.9 | 27.8      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 252.5  | 1.5       |                         |      | G3/500  |
| BL   | (0°-30°)    | 1010.1 | 6.1       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 2226.1 | 13.4      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1148.2 | 6.9       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 89.7   | 0.5       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G3**

Type IV Short





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CATALOG NUMBER: MEM2-HSN-SA-130-740-U-T4W

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 43°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 |
| 2.5°  | 2904.2 | 2900.9 | 2890.8 | 2884.1 | 2863.9 | 2860.5 | 2860.5 | 2840.3 | 2816.7 | 2803.3 | 2789.8 |
| 5°    | 3035.5 | 3018.7 | 3011.9 | 2998.5 | 2964.8 | 2944.6 | 2951.4 | 2914.3 | 2867.2 | 2833.6 | 2796.6 |
| 7.5°  | 3153.3 | 3146.5 | 3123.0 | 3106.2 | 3065.8 | 3045.6 | 3038.9 | 2981.6 | 2921.1 | 2870.6 | 2810.0 |
| 10°   | 3294.6 | 3277.8 | 3264.3 | 3230.7 | 3176.8 | 3146.5 | 3136.4 | 3062.4 | 2985.0 | 2917.7 | 2836.9 |
| 12.5° | 3422.5 | 3402.3 | 3385.5 | 3351.8 | 3298.0 | 3247.5 | 3234.0 | 3149.9 | 3052.3 | 2961.5 | 2860.5 |
| 15°   | 3520.1 | 3523.5 | 3506.6 | 3476.3 | 3415.8 | 3355.2 | 3345.1 | 3234.0 | 3116.3 | 3005.2 | 2884.1 |
| 17.5° | 3611.0 | 3624.4 | 3614.3 | 3594.1 | 3533.6 | 3473.0 | 3462.9 | 3338.4 | 3197.0 | 3055.7 | 2911.0 |
| 20°   | 3698.5 | 3698.5 | 3695.1 | 3681.6 | 3637.9 | 3597.5 | 3577.3 | 3452.8 | 3274.4 | 3109.5 | 2948.0 |
| 22.5° | 3748.9 | 3762.4 | 3762.4 | 3762.4 | 3735.5 | 3701.8 | 3695.1 | 3573.9 | 3378.7 | 3176.8 | 2981.6 |
| 25°   | 3826.3 | 3843.2 | 3843.2 | 3836.4 | 3812.9 | 3802.8 | 3792.7 | 3678.3 | 3479.7 | 3254.2 | 3018.7 |
| 27.5° | 3991.2 | 3987.9 | 3960.9 | 3927.3 | 3893.6 | 3890.3 | 3876.8 | 3796.0 | 3597.5 | 3338.4 | 3069.1 |
| 30°   | 4220.1 | 4226.8 | 4193.1 | 4088.8 | 4011.4 | 3994.6 | 3998.0 | 3927.3 | 3735.5 | 3436.0 | 3126.4 |
| 32.5° | 4570.1 | 4570.1 | 4438.8 | 4304.2 | 4193.1 | 4149.4 | 4139.3 | 4078.7 | 3876.8 | 3543.6 | 3190.3 |
| 35°   | 4832.6 | 4822.5 | 4748.4 | 4590.3 | 4452.3 | 4327.8 | 4310.9 | 4230.2 | 4035.0 | 3664.8 | 3261.0 |
| 37.5° | 5031.1 | 5051.3 | 4994.1 | 4872.9 | 4738.3 | 4522.9 | 4489.3 | 4374.9 | 4179.7 | 3782.6 | 3331.6 |
| 40°   | 5414.7 | 5364.3 | 5226.3 | 5115.2 | 4953.7 | 4714.8 | 4684.5 | 4543.1 | 4327.8 | 3913.8 | 3419.1 |
| 42.5° | 5694.1 | 5623.4 | 5465.2 | 5317.2 | 5115.2 | 4906.6 | 4879.7 | 4724.9 | 4499.4 | 4061.9 | 3510.0 |
| 45°   | 6094.5 | 5936.4 | 5717.6 | 5586.4 | 5300.3 | 5115.2 | 5081.6 | 4913.3 | 4677.7 | 4220.1 | 3624.4 |
| 47.5° | 6481.5 | 6205.6 | 5973.4 | 5912.8 | 5502.2 | 5340.7 | 5313.8 | 5118.6 | 4869.6 | 4391.7 | 3735.5 |
| 50°   | 6431.1 | 6249.3 | 6171.9 | 6114.7 | 5677.2 | 5552.7 | 5525.8 | 5327.2 | 5064.8 | 4573.4 | 3846.5 |
| 52.5° | 6303.2 | 6320.0 | 6323.4 | 6185.4 | 5842.1 | 5751.3 | 5724.4 | 5552.7 | 5266.7 | 4731.6 | 3954.2 |
| 55°   | 6437.8 | 6458.0 | 6454.6 | 6246.0 | 6034.0 | 5949.8 | 5933.0 | 5781.6 | 5461.9 | 4879.7 | 4031.6 |
| 57.5° | 6643.1 | 6575.8 | 6565.7 | 6397.4 | 6239.2 | 6161.8 | 6141.6 | 6010.4 | 5626.8 | 4987.4 | 4092.2 |
| 60°   | 6680.1 | 6545.5 | 6589.2 | 6431.1 | 6394.0 | 6370.5 | 6363.8 | 6209.0 | 5781.6 | 5074.9 | 4115.7 |
| 62.5° | 6266.2 | 6242.6 | 6414.2 | 6350.3 | 6474.8 | 6542.1 | 6545.5 | 6350.3 | 5865.7 | 5108.5 | 4092.2 |
| 65°   | 5559.5 | 5653.7 | 6023.9 | 6209.0 | 6596.0 | 6787.8 | 6781.1 | 6434.4 | 5855.6 | 5010.9 | 3947.5 |
| 67.5° | 4708.0 | 4782.1 | 5303.7 | 5889.3 | 6569.0 | 6919.0 | 6915.7 | 6471.4 | 5680.6 | 4741.7 | 3621.0 |
| 70°   | 3570.6 | 3802.8 | 4543.1 | 5313.8 | 6205.6 | 6659.9 | 6717.1 | 6262.8 | 5280.1 | 4250.4 | 3126.4 |
| 72.5° | 2715.8 | 2752.8 | 3648.0 | 4455.6 | 5556.1 | 6044.1 | 6034.0 | 5596.5 | 4610.4 | 3580.7 | 2604.7 |
| 75°   | 1928.3 | 2009.1 | 2746.1 | 3452.8 | 4553.2 | 5095.0 | 5071.5 | 4590.3 | 3678.3 | 2786.5 | 1992.2 |
| 77.5° | 1437.0 | 1467.3 | 2009.1 | 2561.0 | 3405.7 | 3893.6 | 3883.5 | 3392.2 | 2705.7 | 2046.1 | 1484.1 |
| 80°   | 1050.0 | 1100.4 | 1447.1 | 1787.0 | 2308.6 | 2729.2 | 2715.8 | 2251.4 | 1736.5 | 1430.2 | 1083.6 |
| 82.5° | 588.9  | 625.9  | 841.3  | 1080.3 | 1218.2 | 1349.5 | 1292.3 | 1080.3 | 790.8  | 615.8  | 531.7  |
| 85°   | 16.8   | 20.2   | 30.3   | 37.0   | 63.9   | 107.7  | 117.8  | 104.3  | 124.5  | 77.4   | 84.1   |
| 87.5° | 6.7    | 6.7    | 6.7    | 6.7    | 6.7    | 10.1   | 10.1   | 10.1   | 10.1   | 10.1   | 10.1   |
| 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: P868119

CATALOG NUMBER: MEM2-HSN-SA-130-740-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 | 2776.4 |
| 2.5°  | 2783.1 | 2769.6 | 2742.7 | 2725.9 | 2715.8 | 2702.3 | 2682.1 | 2668.7 | 2658.6 | 2672.0 | 2668.7 |
| 5°    | 2779.7 | 2752.8 | 2705.7 | 2672.0 | 2638.4 | 2611.5 | 2581.2 | 2557.6 | 2544.2 | 2550.9 | 2547.5 |
| 7.5°  | 2779.7 | 2746.1 | 2672.0 | 2618.2 | 2567.7 | 2527.3 | 2493.7 | 2463.4 | 2449.9 | 2453.3 | 2449.9 |
| 10°   | 2793.2 | 2746.1 | 2648.5 | 2571.1 | 2503.8 | 2456.7 | 2419.6 | 2392.7 | 2382.6 | 2392.7 | 2396.1 |
| 12.5° | 2806.6 | 2746.1 | 2628.3 | 2530.7 | 2443.2 | 2392.7 | 2359.1 | 2342.2 | 2349.0 | 2352.3 | 2355.7 |
| 15°   | 2813.4 | 2742.7 | 2608.1 | 2483.6 | 2386.0 | 2332.1 | 2312.0 | 2308.6 | 2325.4 | 2342.2 | 2345.6 |
| 17.5° | 2830.2 | 2739.3 | 2577.8 | 2436.5 | 2335.5 | 2291.8 | 2281.7 | 2295.1 | 2328.8 | 2352.3 | 2359.1 |
| 20°   | 2850.4 | 2746.1 | 2544.2 | 2379.3 | 2285.0 | 2251.4 | 2268.2 | 2298.5 | 2338.9 | 2372.5 | 2379.3 |
| 22.5° | 2870.6 | 2749.4 | 2513.9 | 2328.8 | 2231.2 | 2224.5 | 2261.5 | 2305.2 | 2352.3 | 2386.0 | 2392.7 |
| 25°   | 2894.1 | 2749.4 | 2473.5 | 2264.8 | 2177.3 | 2187.4 | 2244.6 | 2301.9 | 2345.6 | 2389.4 | 2396.1 |
| 27.5° | 2917.7 | 2756.2 | 2429.7 | 2194.2 | 2110.0 | 2140.3 | 2211.0 | 2281.7 | 2328.8 | 2372.5 | 2382.6 |
| 30°   | 2958.1 | 2769.6 | 2392.7 | 2133.6 | 2042.7 | 2083.1 | 2167.2 | 2248.0 | 2298.5 | 2345.6 | 2355.7 |
| 32.5° | 2998.5 | 2789.8 | 2362.4 | 2069.7 | 1975.4 | 2022.5 | 2116.8 | 2207.6 | 2261.5 | 2305.2 | 2312.0 |
| 35°   | 3052.3 | 2816.7 | 2338.9 | 2005.7 | 1908.1 | 1945.1 | 2046.1 | 2147.1 | 2207.6 | 2241.3 | 2258.1 |
| 37.5° | 3109.5 | 2853.8 | 2318.7 | 1948.5 | 1834.1 | 1867.7 | 1975.4 | 2083.1 | 2147.1 | 2180.7 | 2187.4 |
| 40°   | 3180.2 | 2904.2 | 2305.2 | 1894.7 | 1763.4 | 1790.3 | 1898.0 | 2015.8 | 2076.4 | 2099.9 | 2113.4 |
| 42.5° | 3257.6 | 2958.1 | 2295.1 | 1840.8 | 1686.0 | 1712.9 | 1827.4 | 1941.8 | 2002.3 | 2022.5 | 2032.6 |
| 45°   | 3355.2 | 3028.8 | 2288.4 | 1783.6 | 1622.1 | 1645.6 | 1760.0 | 1874.5 | 1924.9 | 1951.9 | 1962.0 |
| 47.5° | 3446.1 | 3099.4 | 2268.2 | 1716.3 | 1551.4 | 1585.1 | 1689.4 | 1790.3 | 1847.5 | 1864.4 | 1874.5 |
| 50°   | 3536.9 | 3160.0 | 2227.8 | 1642.3 | 1487.5 | 1517.7 | 1612.0 | 1686.0 | 1729.8 | 1749.9 | 1756.7 |
| 52.5° | 3624.4 | 3203.8 | 2163.9 | 1564.9 | 1420.2 | 1440.3 | 1517.7 | 1588.4 | 1618.7 | 1625.4 | 1645.6 |
| 55°   | 3681.6 | 3227.3 | 2073.0 | 1474.0 | 1352.8 | 1359.6 | 1416.8 | 1480.7 | 1497.6 | 1500.9 | 1500.9 |
| 57.5° | 3722.0 | 3213.8 | 1965.3 | 1383.1 | 1285.5 | 1285.5 | 1319.2 | 1369.7 | 1376.4 | 1379.8 | 1386.5 |
| 60°   | 3728.7 | 3166.7 | 1827.4 | 1299.0 | 1211.5 | 1201.4 | 1235.1 | 1265.3 | 1268.7 | 1275.4 | 1282.2 |
| 62.5° | 3678.3 | 3062.4 | 1679.3 | 1218.2 | 1140.8 | 1117.3 | 1147.6 | 1177.9 | 1194.7 | 1204.8 | 1211.5 |
| 65°   | 3523.5 | 2850.4 | 1511.0 | 1137.5 | 1073.5 | 1033.1 | 1070.2 | 1120.6 | 1154.3 | 1157.7 | 1157.7 |
| 67.5° | 3200.4 | 2507.1 | 1332.7 | 1053.3 | 992.8  | 955.7  | 1002.9 | 1056.7 | 1097.1 | 1113.9 | 1110.5 |
| 70°   | 2712.4 | 2126.9 | 1167.8 | 965.8  | 912.0  | 888.4  | 938.9  | 999.5  | 1033.1 | 1046.6 | 1053.3 |
| 72.5° | 2184.1 | 1702.8 | 1023.0 | 878.3  | 841.3  | 827.9  | 878.3  | 938.9  | 986.0  | 1006.2 | 1009.6 |
| 75°   | 1699.5 | 1339.4 | 901.9  | 787.5  | 757.2  | 760.6  | 814.4  | 875.0  | 925.5  | 935.5  | 905.3  |
| 77.5° | 1319.2 | 1066.8 | 787.5  | 679.8  | 663.0  | 686.5  | 740.4  | 804.3  | 834.6  | 844.7  | 824.5  |
| 80°   | 952.4  | 817.8  | 636.0  | 535.1  | 535.1  | 572.1  | 619.2  | 693.2  | 703.3  | 689.9  | 696.6  |
| 82.5° | 450.9  | 397.1  | 313.0  | 259.1  | 242.3  | 269.2  | 286.0  | 309.6  | 336.5  | 343.3  | 326.4  |
| 85°   | 60.6   | 40.4   | 30.3   | 33.7   | 30.3   | 20.2   | 13.5   | 13.5   | 13.5   | 10.1   | 10.1   |
| 87.5° | 10.1   | 10.1   | 6.7    | 6.7    | 6.7    | 6.7    | 6.7    | 6.7    | 3.4    | 3.4    | 3.4    |
| 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: SP1-2407-157-5

Test Date: 08/07/2024

Luminaire Tested: MEM2-HTN-SA-40-740-U-5WQ-2

Data in this report applies to families of products including MEM2-HTN-SA-40-740-U-5WQ-2

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-5  
 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-40-740-U-5WQ-2**  
 Description: Epic Modern Light Square 40W 5WQ Optic and Flare Trim

**Spectral Parameters**

CCT (K): 3915  
 CIE u': 0.2262  
 CIE v': 0.5044  
 Duv: 0.0010  
 CIE x: 0.3850  
 CIE y: 0.3816  
 CIE z: 0.2334  
 Peak Wavelength (nm): 449  
 Dominant Wavelength (nm): 578  
 Purity: 30.05482  
 Rf: 73.2  
 Rg: 93.9

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.0 |      |       |
| R1:       | 67.6 | R9:  | -38.4 |
| R2:       | 78.3 | R10: | 48.9  |
| R3:       | 87.1 | R11: | 65.3  |
| R4:       | 69.7 | R12: | 40.4  |
| R5:       | 67.4 | R13: | 69.3  |
| R6:       | 69.3 | R14: | 92.6  |
| R7:       | 79.7 | R15: | 59.9  |
| R8:       | 48.7 |      |       |



**Test Conditions**

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

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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**

| 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    | 112                      | NR            | 620    | 618                      | NR            | 750    | 15                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 153                      | NR            | 625    | 563                      | NR            | 755    | 13                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 216                      | NR            | 630    | 510                      | NR            | 760    | 11                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 291                      | NR            | 635    | 456                      | NR            | 765    | 9                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 366                      | NR            | 640    | 407                      | NR            | 770    | 8                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 436                      | NR            | 645    | 359                      | NR            | 775    | 7                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 492                      | NR            | 650    | 316                      | NR            | 780    | 6                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 536                      | NR            | 655    | 277                      | NR            | 785    | 5                        | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 567                      | NR            | 660    | 240                      | NR            | 790    | 4                        | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 596                      | NR            | 665    | 208                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 12                       | NR            | 540    | 619                      | NR            | 670    | 179                      | NR            | 800    | 3                        | NR            | 930    | 0                        | NR            |
| 415    | 25                       | NR            | 545    | 644                      | NR            | 675    | 154                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 51                       | NR            | 550    | 671                      | NR            | 680    | 133                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 100                      | NR            | 555    | 701                      | NR            | 685    | 114                      | NR            | 815    | 2                        | NR            | 945    | 0                        | NR            |
| 430    | 180                      | NR            | 560    | 735                      | NR            | 690    | 98                       | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 315                      | NR            | 565    | 768                      | NR            | 695    | 83                       | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 514                      | NR            | 570    | 798                      | NR            | 700    | 71                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 828                      | NR            | 575    | 825                      | NR            | 705    | 61                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 992                      | NR            | 580    | 843                      | NR            | 710    | 52                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 652                      | NR            | 585    | 848                      | NR            | 715    | 44                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 382                      | NR            | 590    | 844                      | NR            | 720    | 38                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 282                      | NR            | 595    | 826                      | NR            | 725    | 32                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 180                      | NR            | 600    | 800                      | NR            | 730    | 28                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 119                      | NR            | 605    | 762                      | NR            | 735    | 24                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 101                      | NR            | 610    | 719                      | NR            | 740    | 20                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 98                       | NR            | 615    | 669                      | NR            | 745    | 17                       | NR            | 875    | 0                        | NR            |        |                          |               |

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Scotopic Flux vs. Wavelength



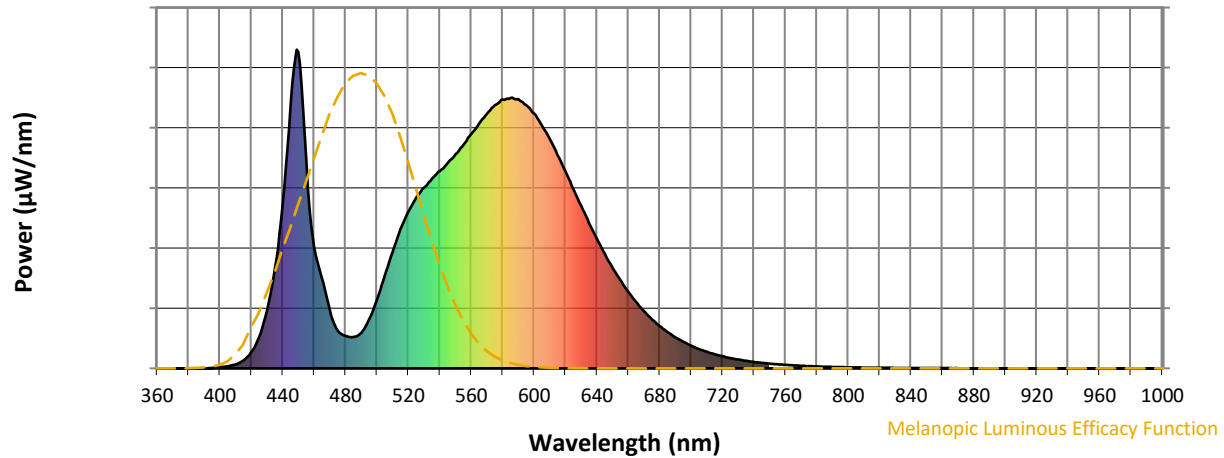
Scotopic Lumens: NR

S/P: 1.49

| 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    | 112                      | NR            | 620    | 618                      | NR            | 750    | 15                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 153                      | NR            | 625    | 563                      | NR            | 755    | 13                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 216                      | NR            | 630    | 510                      | NR            | 760    | 11                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 291                      | NR            | 635    | 456                      | NR            | 765    | 9                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 366                      | NR            | 640    | 407                      | NR            | 770    | 8                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 436                      | NR            | 645    | 359                      | NR            | 775    | 7                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 492                      | NR            | 650    | 316                      | NR            | 780    | 6                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 536                      | NR            | 655    | 277                      | NR            | 785    | 5                        | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 567                      | NR            | 660    | 240                      | NR            | 790    | 4                        | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 596                      | NR            | 665    | 208                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 12                       | NR            | 540    | 619                      | NR            | 670    | 179                      | NR            | 800    | 3                        | NR            | 930    | 0                        | NR            |
| 415    | 25                       | NR            | 545    | 644                      | NR            | 675    | 154                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 51                       | NR            | 550    | 671                      | NR            | 680    | 133                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 100                      | NR            | 555    | 701                      | NR            | 685    | 114                      | NR            | 815    | 2                        | NR            | 945    | 0                        | NR            |
| 430    | 180                      | NR            | 560    | 735                      | NR            | 690    | 98                       | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 315                      | NR            | 565    | 768                      | NR            | 695    | 83                       | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 514                      | NR            | 570    | 798                      | NR            | 700    | 71                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 828                      | NR            | 575    | 825                      | NR            | 705    | 61                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 992                      | NR            | 580    | 843                      | NR            | 710    | 52                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 652                      | NR            | 585    | 848                      | NR            | 715    | 44                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 382                      | NR            | 590    | 844                      | NR            | 720    | 38                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 282                      | NR            | 595    | 826                      | NR            | 725    | 32                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 180                      | NR            | 600    | 800                      | NR            | 730    | 28                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 119                      | NR            | 605    | 762                      | NR            | 735    | 24                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 101                      | NR            | 610    | 719                      | NR            | 740    | 20                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 98                       | NR            | 615    | 669                      | NR            | 745    | 17                       | NR            | 875    | 0                        | NR            |        |                          |               |

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Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 2.88

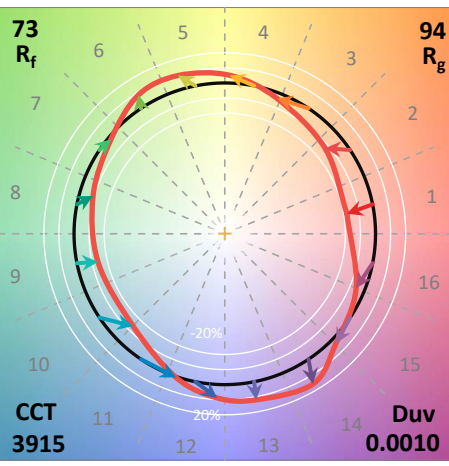
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 112                      | NR            | 620    | 618                      | NR            | 750    | 15                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 153                      | NR            | 625    | 563                      | NR            | 755    | 13                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 216                      | NR            | 630    | 510                      | NR            | 760    | 11                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 291                      | NR            | 635    | 456                      | NR            | 765    | 9                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 366                      | NR            | 640    | 407                      | NR            | 770    | 8                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 436                      | NR            | 645    | 359                      | NR            | 775    | 7                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 492                      | NR            | 650    | 316                      | NR            | 780    | 6                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 536                      | NR            | 655    | 277                      | NR            | 785    | 5                        | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 567                      | NR            | 660    | 240                      | NR            | 790    | 4                        | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 596                      | NR            | 665    | 208                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 12                       | NR            | 540    | 619                      | NR            | 670    | 179                      | NR            | 800    | 3                        | NR            | 930    | 0                        | NR            |
| 415    | 25                       | NR            | 545    | 644                      | NR            | 675    | 154                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 51                       | NR            | 550    | 671                      | NR            | 680    | 133                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 100                      | NR            | 555    | 701                      | NR            | 685    | 114                      | NR            | 815    | 2                        | NR            | 945    | 0                        | NR            |
| 430    | 180                      | NR            | 560    | 735                      | NR            | 690    | 98                       | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 315                      | NR            | 565    | 768                      | NR            | 695    | 83                       | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 514                      | NR            | 570    | 798                      | NR            | 700    | 71                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 828                      | NR            | 575    | 825                      | NR            | 705    | 61                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 992                      | NR            | 580    | 843                      | NR            | 710    | 52                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 652                      | NR            | 585    | 848                      | NR            | 715    | 44                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 382                      | NR            | 590    | 844                      | NR            | 720    | 38                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 282                      | NR            | 595    | 826                      | NR            | 725    | 32                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 180                      | NR            | 600    | 800                      | NR            | 730    | 28                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 119                      | NR            | 605    | 762                      | NR            | 735    | 24                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 101                      | NR            | 610    | 719                      | NR            | 740    | 20                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 98                       | NR            | 615    | 669                      | NR            | 745    | 17                       | NR            | 875    | 0                        | NR            |        |                          |               |

**Summary**

$R_f = 73.2$   
 $R_g = 93.9$   
 $CIE R_a = 71.0$   
 $R_g = -38.4$



**Color Vector Graphics**



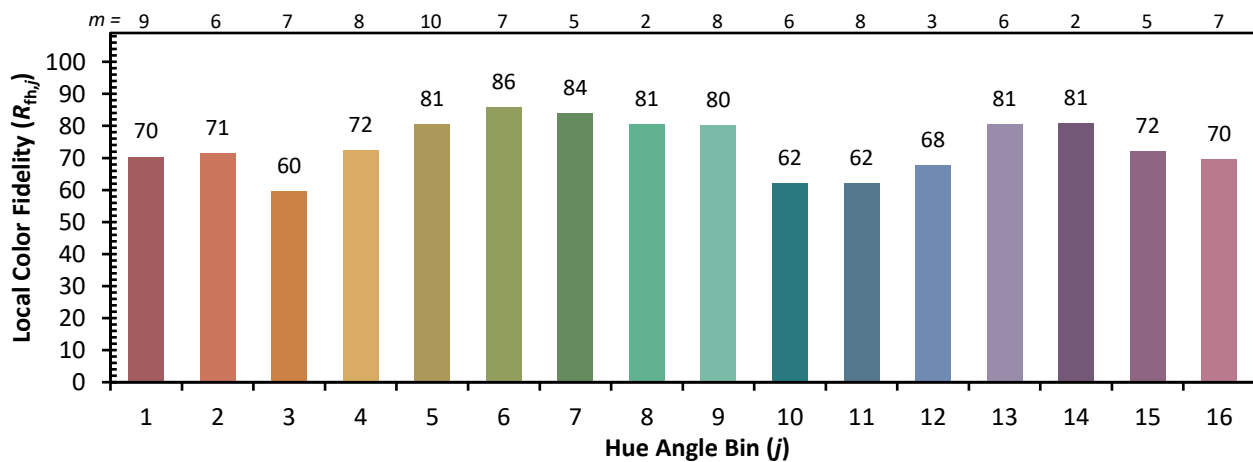


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 61 | CES51 = 88 | CES76 = 50 |
| CES02 = 61 | CES27 = 88 | CES52 = 87 | CES77 = 69 |
| CES03 = 30 | CES28 = 81 | CES53 = 77 | CES78 = 53 |
| CES04 = 70 | CES29 = 65 | CES54 = 84 | CES79 = 81 |
| CES05 = 47 | CES30 = 81 | CES55 = 83 | CES80 = 78 |
| CES06 = 50 | CES31 = 69 | CES56 = 73 | CES81 = 77 |
| CES07 = 40 | CES32 = 60 | CES57 = 72 | CES82 = 91 |
| CES08 = 39 | CES33 = 76 | CES58 = 73 | CES83 = 89 |
| CES09 = 29 | CES34 = 70 | CES59 = 85 | CES84 = 86 |
| CES10 = 74 | CES35 = 83 | CES60 = 89 | CES85 = 77 |
| CES11 = 57 | CES36 = 91 | CES61 = 81 | CES86 = 71 |
| CES12 = 63 | CES37 = 79 | CES62 = 85 | CES87 = 76 |
| CES13 = 42 | CES38 = 92 | CES63 = 72 | CES88 = 80 |
| CES14 = 74 | CES39 = 96 | CES64 = 64 | CES89 = 70 |
| CES15 = 71 | CES40 = 91 | CES65 = 61 | CES90 = 79 |
| CES16 = 46 | CES41 = 93 | CES66 = 57 | CES91 = 74 |
| CES17 = 49 | CES42 = 80 | CES67 = 54 | CES92 = 57 |
| CES18 = 56 | CES43 = 76 | CES68 = 63 | CES93 = 74 |
| CES19 = 72 | CES44 = 99 | CES69 = 73 | CES94 = 51 |
| CES20 = 65 | CES45 = 85 | CES70 = 55 | CES95 = 65 |
| CES21 = 86 | CES46 = 82 | CES71 = 48 | CES96 = 76 |
| CES22 = 78 | CES47 = 86 | CES72 = 83 | CES97 = 84 |
| CES23 = 92 | CES48 = 77 | CES73 = 45 | CES98 = 75 |
| CES24 = 91 | CES49 = 80 | CES74 = 93 | CES99 = 62 |
| CES25 = 72 | CES50 = 88 | CES75 = 51 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)