

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: McGRAW-EDISON

Report Number: P510726

Luminaire Tested: **CTN-CA8-230-740-U-T2-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510726  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-15)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: CTN-CA8-230-740-U-T2-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (8) 4000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 32625 lumens  
Efficiency: N/A  
Efficacy: 142.8 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G4

Input Watts (W): 228.4  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT

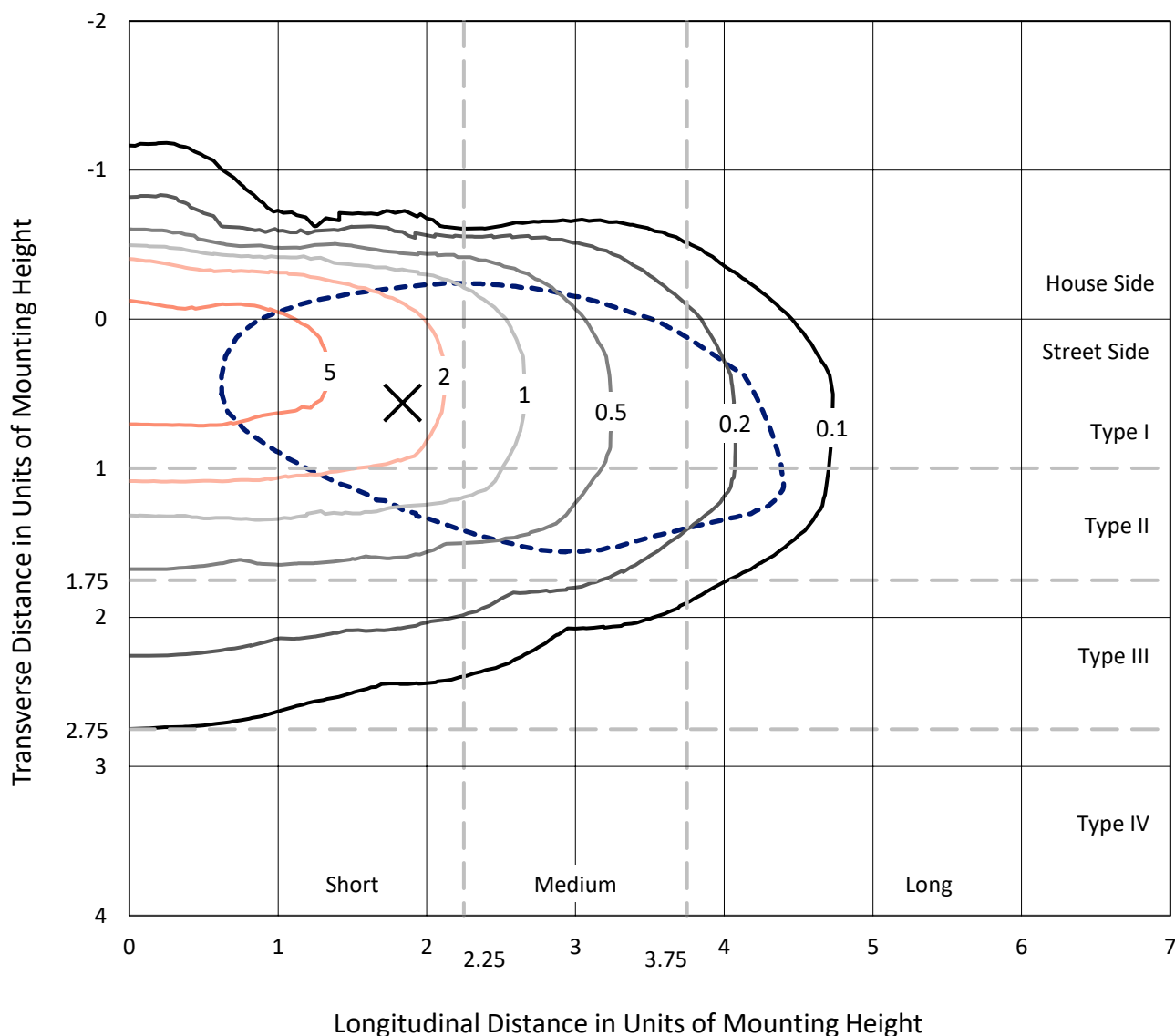


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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

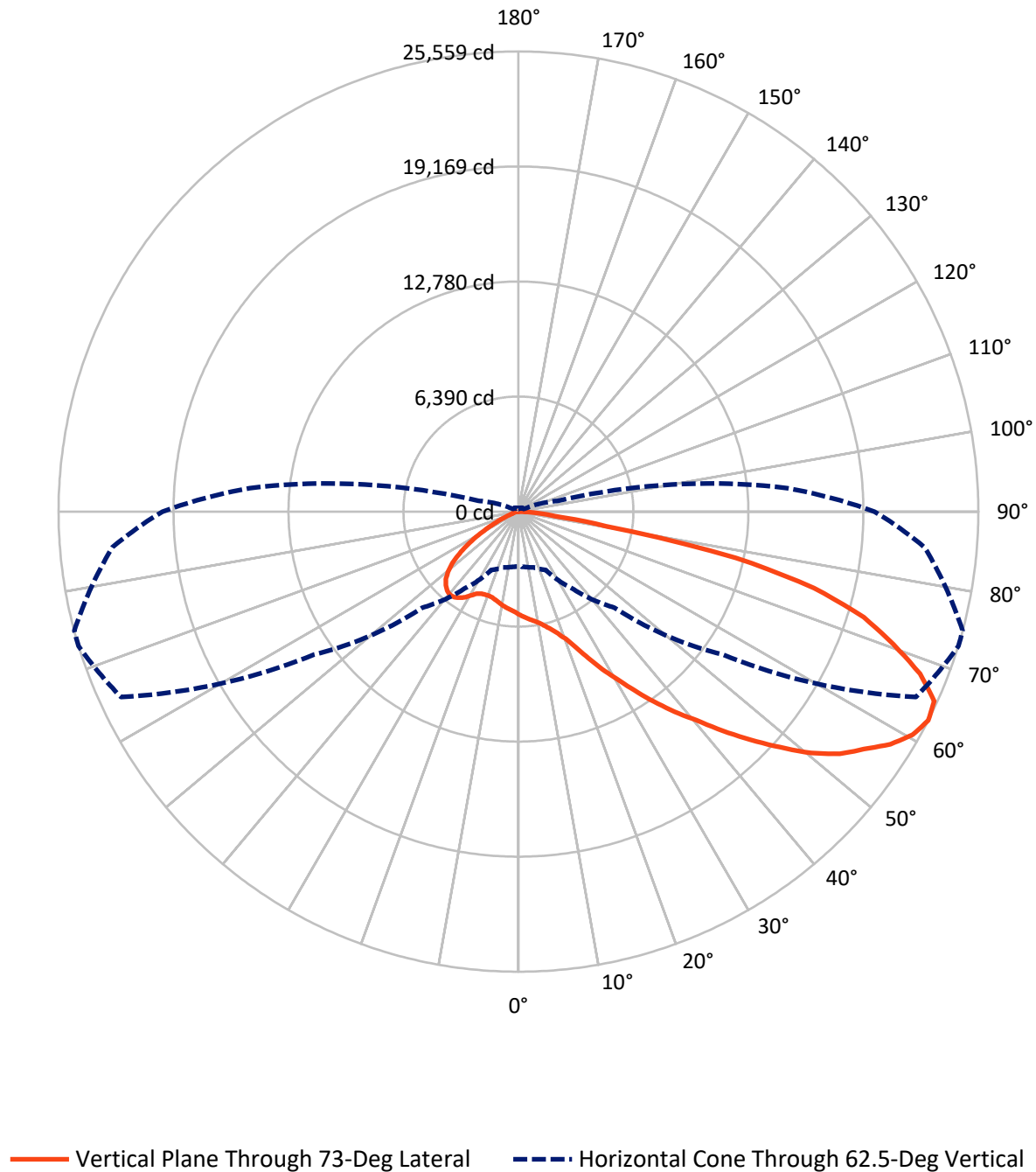
--- 1/2 Max cd



Based on 30 foot mounting height. Maximum calculated value = 7.9 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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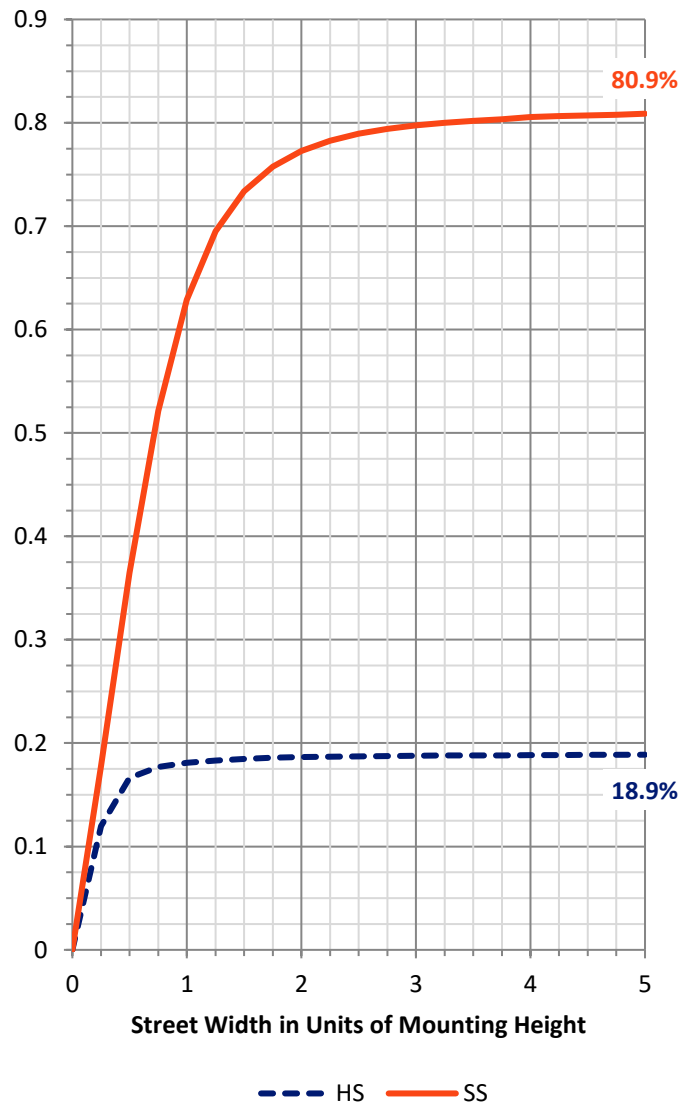
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 6241.0   | 0.0    | 6241.0  |
|                    | % Fixture | 19.1     | 0.0    | 19.1    |
| <b>Street Side</b> | Lumens    | 26384.0  | 0.0    | 26384.0 |
|                    | % Fixture | 80.9     | 0.0    | 80.9    |
| <b>Total</b>       | Lumens    | 32625.0  | 0.0    | 32625.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 546.5   | 1.7       |
| 10°-20°   | 1643.7  | 5.0       |
| 20°-30°   | 2840.0  | 8.7       |
| 30°-40°   | 4270.7  | 13.1      |
| 40°-50°   | 5694.6  | 17.5      |
| 50°-60°   | 6706.5  | 20.6      |
| 60°-70°   | 6667.4  | 20.4      |
| 70°-80°   | 3827.9  | 11.7      |
| 80°-90°   | 427.6   | 1.3       |
| 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°    | 32625.0 | 100.0     |
| 0°-180°   | 32625.0 | 100.0     |

**Coefficient of Utilization**



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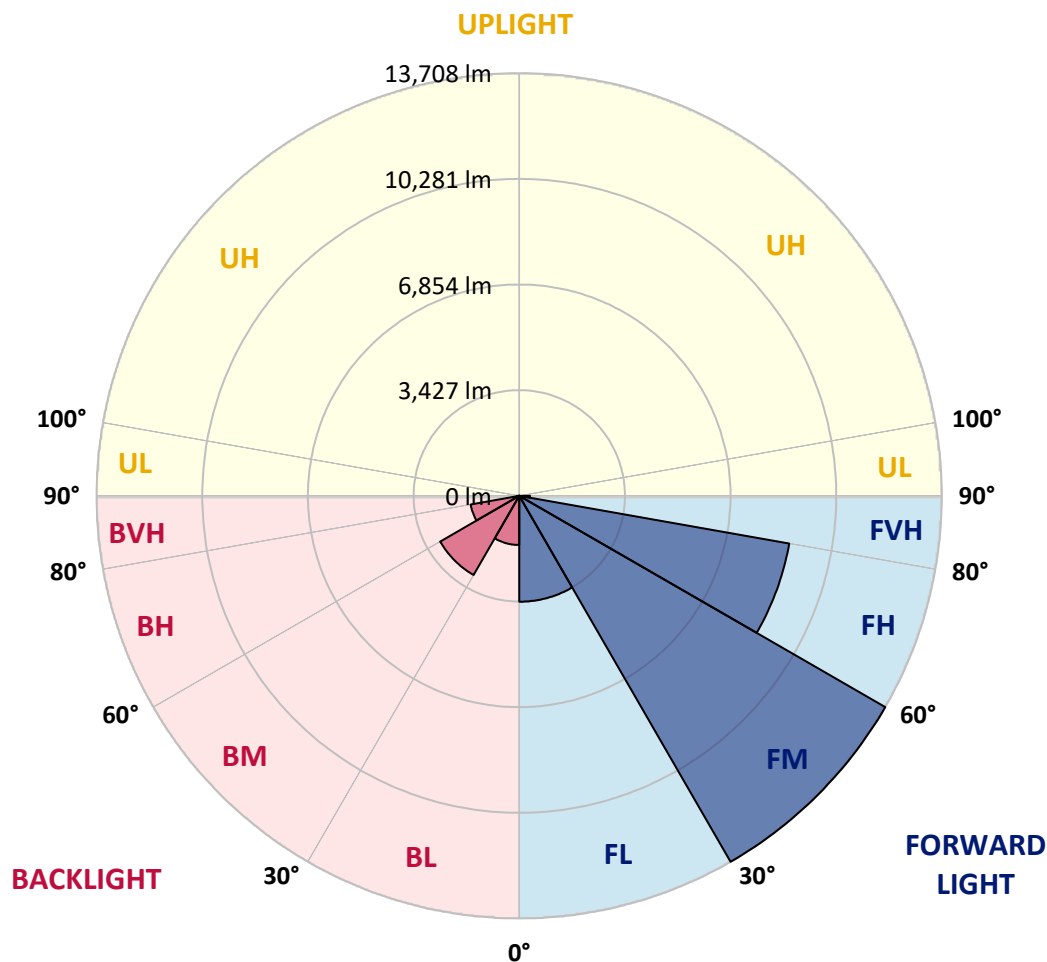
CATALOG NUMBER: CTN-CA8-230-740-U-T2-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 3435.4  | 10.5      |                         |      |          |
| FM   | (30°-60°)   | 13708.2 | 42.0      |                         |      |          |
| FH   | (60°-80°)   | 8893.1  | 27.3      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 347.3   | 1.1       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1594.9  | 4.9       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2963.5  | 9.1       | B3/5000                 |      |          |
| BH   | (60°-80°)   | 1602.3  | 4.9       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 80.3    | 0.2       |                         |      | G1/100   |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**

Type II Short





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CATALOG NUMBER: CTN-CA8-230-740-U-T2-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 55°     | 65°     | 73°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 5721.7 | 5721.7 | 5721.7 | 5721.7 | 5721.7  | 5721.7  | 5721.7  | 5721.7  | 5721.7  | 5721.7  | 5721.7  |
| 2.5°  | 6121.5 | 6136.9 | 6118.6 | 6110.5 | 6101.8  | 6044.6  | 5978.0  | 5909.9  | 5855.0  | 5846.2  | 5774.4  |
| 5°    | 6551.4 | 6559.5 | 6529.4 | 6495.0 | 6435.7  | 6341.2  | 6221.9  | 6104.0  | 5994.1  | 5964.8  | 5833.7  |
| 7.5°  | 6881.7 | 6866.3 | 6859.0 | 6829.7 | 6777.7  | 6673.7  | 6492.8  | 6299.5  | 6129.6  | 6088.6  | 5889.4  |
| 10°   | 7191.5 | 7184.9 | 7129.2 | 7092.6 | 7009.8  | 6913.9  | 6765.3  | 6519.9  | 6280.4  | 6214.5  | 5937.7  |
| 12.5° | 7526.9 | 7512.2 | 7489.5 | 7410.4 | 7343.1  | 7181.2  | 7001.8  | 6778.4  | 6511.9  | 6424.0  | 6020.5  |
| 15°   | 7828.6 | 7789.0 | 7776.6 | 7693.8 | 7625.7  | 7502.0  | 7321.8  | 7062.6  | 6777.7  | 6702.3  | 6177.9  |
| 17.5° | 8115.7 | 8097.4 | 8069.5 | 8013.1 | 7937.0  | 7841.8  | 7697.5  | 7420.0  | 7125.6  | 7015.7  | 6445.2  |
| 20°   | 8359.5 | 8336.8 | 8312.7 | 8328.0 | 8311.2  | 8250.4  | 8159.6  | 7923.1  | 7563.5  | 7457.3  | 6770.4  |
| 22.5° | 8529.4 | 8528.7 | 8625.4 | 8681.8 | 8714.0  | 8711.8  | 8689.8  | 8555.8  | 8194.0  | 8086.4  | 7256.6  |
| 25°   | 8670.8 | 8681.8 | 8804.1 | 9018.6 | 9210.5  | 9228.1  | 9383.3  | 9319.6  | 9012.0  | 8900.0  | 7988.2  |
| 27.5° | 8712.5 | 8734.5 | 8956.4 | 9294.0 | 9585.4  | 9865.2  | 10093.0 | 10209.4 | 9924.5  | 9790.5  | 8774.8  |
| 30°   | 8742.5 | 8751.3 | 8968.8 | 9373.1 | 9987.5  | 10430.6 | 10837.7 | 11034.7 | 10789.4 | 10691.3 | 9651.4  |
| 32.5° | 8530.9 | 8533.8 | 8867.0 | 9479.3 | 10282.6 | 11050.8 | 11532.7 | 11904.0 | 11839.6 | 11709.9 | 10610.0 |
| 35°   | 8239.4 | 8293.6 | 8675.9 | 9376.7 | 10525.8 | 11620.6 | 12276.8 | 12830.4 | 12959.3 | 12866.3 | 11567.9 |
| 37.5° | 7879.1 | 7921.6 | 8331.0 | 9224.4 | 10579.2 | 12012.4 | 12855.3 | 13772.2 | 14109.0 | 14093.7 | 12724.2 |
| 40°   | 7436.1 | 7488.1 | 7978.0 | 8896.3 | 10552.9 | 12297.3 | 13534.2 | 14815.0 | 15242.7 | 15194.4 | 13871.0 |
| 42.5° | 6912.4 | 6988.6 | 7463.9 | 8474.5 | 10360.3 | 12471.6 | 14090.0 | 15876.9 | 16646.6 | 16615.1 | 14886.0 |
| 45°   | 6394.7 | 6435.7 | 6869.2 | 7887.2 | 10005.8 | 12527.9 | 14612.9 | 17340.1 | 18086.3 | 18051.2 | 16109.0 |
| 47.5° | 5860.8 | 5896.7 | 6349.3 | 7268.4 | 9390.6  | 12414.4 | 15026.6 | 18596.7 | 19553.2 | 19518.0 | 17324.0 |
| 50°   | 4618.8 | 4754.3 | 5682.1 | 6724.2 | 8689.8  | 12092.9 | 15417.0 | 20162.5 | 21088.1 | 20938.7 | 18388.0 |
| 52.5° | 3951.6 | 4000.7 | 4481.9 | 6175.7 | 7990.4  | 11544.4 | 15677.7 | 21613.2 | 22350.7 | 22135.4 | 19476.3 |
| 55°   | 3693.9 | 3726.8 | 3962.6 | 5164.4 | 7333.5  | 10714.7 | 15984.5 | 23067.6 | 23297.6 | 23242.6 | 20363.9 |
| 57.5° | 3498.3 | 3534.9 | 3703.4 | 4313.4 | 6641.5  | 9551.8  | 15888.6 | 24090.7 | 24378.5 | 24202.7 | 21306.4 |
| 60°   | 3221.5 | 3266.2 | 3489.5 | 3872.6 | 5855.0  | 8371.2  | 15044.2 | 24509.6 | 25164.3 | 24966.5 | 22023.3 |
| 62.5° | 3047.2 | 3076.5 | 3204.7 | 3576.0 | 5203.2  | 7540.8  | 13842.5 | 24374.8 | 25559.0 | 25551.7 | 22645.1 |
| 65°   | 2810.7 | 2853.9 | 2990.8 | 3291.8 | 4623.2  | 6897.1  | 12708.8 | 23709.1 | 25389.1 | 25395.7 | 22773.2 |
| 67.5° | 2563.1 | 2580.7 | 2724.3 | 2965.9 | 3939.9  | 6307.5  | 11242.0 | 22570.4 | 24065.8 | 24216.6 | 21886.4 |
| 70°   | 2254.1 | 2245.3 | 2400.6 | 2577.1 | 3220.0  | 5355.5  | 9048.7  | 20544.7 | 22110.5 | 22172.7 | 20092.9 |
| 72.5° | 1773.7 | 1781.8 | 1825.0 | 1947.3 | 2444.5  | 4214.6  | 6566.1  | 17357.6 | 20066.5 | 20177.1 | 17800.7 |
| 75°   | 1192.2 | 1205.4 | 1406.8 | 1526.2 | 1758.3  | 3028.9  | 4128.9  | 11716.5 | 16963.7 | 17275.6 | 14568.9 |
| 77.5° | 909.6  | 917.6  | 976.2  | 1106.5 | 1272.1  | 2158.9  | 2238.0  | 6384.4  | 12350.0 | 13090.4 | 11397.2 |
| 80°   | 644.4  | 647.4  | 589.5  | 524.3  | 677.4   | 1464.7  | 1321.9  | 2719.1  | 4921.2  | 5815.4  | 6694.2  |
| 82.5° | 288.5  | 284.1  | 334.7  | 278.3  | 390.3   | 566.8   | 623.9   | 1319.7  | 2043.9  | 2197.0  | 2391.8  |
| 85°   | 134.0  | 150.1  | 172.1  | 144.3  | 232.1   | 219.0   | 243.1   | 562.4   | 957.9   | 1057.5  | 1051.6  |
| 87.5° | 33.0   | 35.9   | 45.4   | 57.9   | 84.2    | 74.7    | 73.2    | 165.5   | 213.8   | 213.1   | 327.4   |
| 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: P510726

CATALOG NUMBER: CTN-CA8-230-740-U-T2-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5721.7  | 5721.7  | 5721.7 | 5721.7 | 5721.7 | 5721.7 | 5721.7 | 5721.7 | 5721.7 | 5721.7 | 5721.7 |
| 2.5°  | 5725.3  | 5687.3  | 5597.2 | 5510.0 | 5427.3 | 5372.4 | 5310.8 | 5246.4 | 5207.6 | 5189.3 | 5228.8 |
| 5°    | 5753.9  | 5681.4  | 5509.3 | 5336.5 | 5190.0 | 5064.8 | 4976.9 | 4902.2 | 4861.9 | 4865.6 | 4867.8 |
| 7.5°  | 5778.1  | 5676.3  | 5435.3 | 5191.5 | 4963.0 | 4807.7 | 4692.8 | 4612.2 | 4566.1 | 4530.9 | 4557.3 |
| 10°   | 5799.3  | 5655.0  | 5348.9 | 5023.8 | 4775.5 | 4545.6 | 4389.6 | 4292.2 | 4207.2 | 4159.6 | 4197.0 |
| 12.5° | 5822.0  | 5647.0  | 5252.3 | 4873.6 | 4552.2 | 4295.1 | 4081.3 | 3984.6 | 3901.1 | 3865.2 | 3887.9 |
| 15°   | 5920.9  | 5677.7  | 5162.2 | 4697.2 | 4331.7 | 3999.2 | 3768.6 | 3649.9 | 3584.0 | 3540.8 | 3550.3 |
| 17.5° | 6090.8  | 5759.0  | 5104.3 | 4512.6 | 4085.7 | 3734.1 | 3435.4 | 3296.9 | 3187.8 | 3157.1 | 3149.0 |
| 20°   | 6332.4  | 5913.6  | 5104.3 | 4356.6 | 3806.6 | 3439.7 | 3095.6 | 2861.9 | 2692.0 | 2628.3 | 2677.4 |
| 22.5° | 6738.2  | 6176.5  | 5154.9 | 4215.3 | 3566.4 | 3134.4 | 2724.3 | 2367.6 | 2138.4 | 2045.4 | 2099.6 |
| 25°   | 7305.7  | 6582.9  | 5236.9 | 4091.5 | 3347.5 | 2782.8 | 2253.4 | 1843.3 | 1590.6 | 1480.0 | 1478.6 |
| 27.5° | 8046.8  | 7204.6  | 5402.4 | 3990.5 | 3085.3 | 2328.1 | 1762.0 | 1367.3 | 1130.0 | 1063.3 | 1072.9 |
| 30°   | 8868.5  | 7878.4  | 5715.1 | 3844.0 | 2766.7 | 1819.1 | 1283.0 | 1004.8 | 837.8  | 749.9  | 751.4  |
| 32.5° | 9660.9  | 8576.3  | 6086.4 | 3748.8 | 2353.0 | 1371.7 | 914.7  | 716.9  | 613.0  | 561.0  | 569.0  |
| 35°   | 10510.4 | 9178.3  | 6362.5 | 3589.1 | 1867.4 | 991.6  | 646.6  | 537.5  | 494.3  | 467.2  | 468.7  |
| 37.5° | 11428.0 | 9840.3  | 6589.5 | 3375.3 | 1411.9 | 681.1  | 477.5  | 460.6  | 442.3  | 407.9  | 405.0  |
| 40°   | 12386.6 | 10607.0 | 6725.0 | 3029.6 | 981.3  | 471.6  | 405.7  | 424.8  | 414.5  | 369.8  | 366.2  |
| 42.5° | 13199.5 | 11198.8 | 6758.7 | 2571.9 | 634.9  | 382.3  | 367.6  | 396.9  | 399.1  | 353.7  | 347.9  |
| 45°   | 13980.2 | 11726.0 | 6692.7 | 1969.2 | 440.1  | 359.6  | 344.2  | 384.5  | 387.4  | 346.4  | 336.9  |
| 47.5° | 14853.8 | 12447.4 | 6573.4 | 1313.8 | 364.0  | 339.8  | 336.1  | 364.0  | 374.2  | 340.5  | 328.8  |
| 50°   | 15915.0 | 13034.0 | 6219.7 | 807.0  | 343.5  | 327.4  | 327.4  | 344.2  | 358.1  | 328.8  | 323.0  |
| 52.5° | 17003.2 | 13545.1 | 5696.1 | 553.6  | 331.0  | 314.2  | 323.7  | 331.0  | 336.1  | 309.8  | 314.9  |
| 55°   | 17783.1 | 13998.5 | 4915.4 | 445.3  | 323.7  | 305.4  | 328.1  | 313.4  | 306.1  | 283.4  | 278.3  |
| 57.5° | 18648.7 | 14537.5 | 4117.2 | 394.7  | 314.2  | 310.5  | 313.4  | 285.6  | 265.1  | 241.7  | 236.5  |
| 60°   | 19252.9 | 14827.5 | 3140.2 | 371.3  | 303.2  | 305.4  | 289.3  | 251.9  | 214.6  | 197.7  | 194.1  |
| 62.5° | 19780.2 | 14993.0 | 2301.7 | 341.3  | 292.9  | 292.2  | 262.2  | 215.3  | 176.5  | 158.2  | 155.3  |
| 65°   | 19700.4 | 14734.4 | 1491.8 | 317.1  | 284.9  | 275.4  | 235.1  | 184.5  | 147.2  | 133.3  | 131.8  |
| 67.5° | 18822.3 | 13590.6 | 939.6  | 292.2  | 271.0  | 254.1  | 210.9  | 164.8  | 135.5  | 119.4  | 117.9  |
| 70°   | 16979.0 | 12010.9 | 574.9  | 260.0  | 240.9  | 224.8  | 186.7  | 154.5  | 128.2  | 109.1  | 105.5  |
| 72.5° | 14431.3 | 10287.0 | 406.4  | 229.2  | 210.2  | 191.1  | 158.2  | 147.2  | 122.3  | 98.1   | 95.2   |
| 75°   | 11856.4 | 7577.4  | 340.5  | 199.9  | 179.4  | 153.8  | 134.7  | 136.9  | 115.0  | 89.3   | 87.1   |
| 77.5° | 8349.3  | 4724.3  | 317.1  | 163.3  | 141.3  | 122.3  | 116.4  | 125.2  | 105.5  | 82.0   | 79.8   |
| 80°   | 4872.9  | 2653.2  | 262.2  | 128.9  | 106.2  | 94.5   | 97.4   | 106.2  | 92.3   | 74.0   | 71.0   |
| 82.5° | 1967.0  | 1050.2  | 184.5  | 100.3  | 77.6   | 75.4   | 79.8   | 86.4   | 76.2   | 62.2   | 60.8   |
| 85°   | 702.3   | 328.1   | 104.7  | 65.9   | 49.8   | 52.0   | 51.3   | 61.5   | 54.9   | 45.4   | 44.7   |
| 87.5° | 184.5   | 65.2    | 46.9   | 26.4   | 21.2   | 21.2   | 19.8   | 28.6   | 26.4   | 20.5   | 22.7   |
| 90°   | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-1

Luminaire Tested: CST-CA6-230-740-U-T4

Test Date: 04/20/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-1  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/20/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA6-230-740-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

230W

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 3783    | CRI (Ra): | 75.1 |      |       |
| CIE u':                   | 0.2297  | R1:       | 72.8 | R9:  | -19.0 |
| CIE v':                   | 0.5046  | R2:       | 81.9 | R10: | 57.0  |
| Duv:                      | -0.0008 | R3:       | 89.0 | R11: | 70.7  |
| CIE x:                    | 0.3897  | R4:       | 74.1 | R12: | 48.2  |
| CIE y:                    | 0.3804  | R5:       | 72.3 | R13: | 74.4  |
| CIE z:                    | 0.2299  | R6:       | 74.5 | R14: | 93.7  |
| Peak Wavelength (nm):     | 450     | R7:       | 81.7 |      |       |
| Dominant Wavelength (nm): | 580     | R8:       | 54.6 |      |       |
| Purity:                   | 31.3    |           |      |      |       |
| Rf:                       | 76.5    |           |      |      |       |
| Rg:                       | 95.6    |           |      |      |       |



### Test Conditions

Stabilization Time: 47M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.5/39%  
 Sphere Temperature (°C): 24.0

REPORT NUMBER: SP1-2104-215-1

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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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 7-step quadrangle

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### Photopic Flux vs. Wavelength

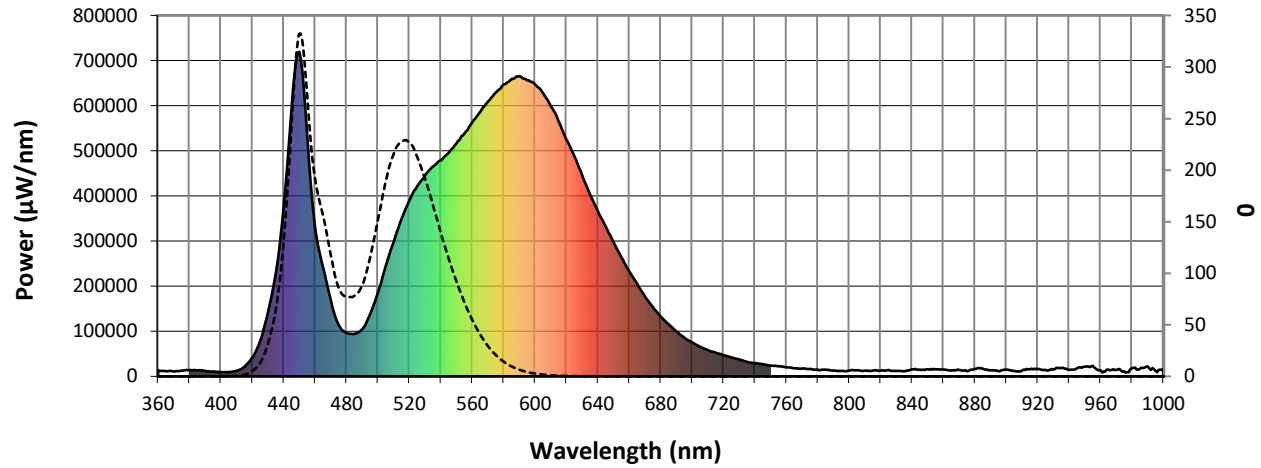


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 13329            | 0.0              | 490       | 105235           | 15.0             | 620       | 524343           | 136.4            | 750       | 24224            | 0.0              | 880       | 16135            | 0.0              |
| 365       | 11697            | 0.0              | 495       | 137678           | 25.0             | 625       | 488932           | 107.9            | 755       | 22376            | 0.0              | 885       | 16876            | 0.0              |
| 370       | 10917            | 0.0              | 500       | 186689           | 41.2             | 630       | 445400           | 80.6             | 760       | 20109            | 0.0              | 890       | 13554            | 0.0              |
| 375       | 12548            | 0.0              | 505       | 244611           | 68.4             | 635       | 403534           | 60.6             | 765       | 18097            | 0.0              | 895       | 11525            | 0.0              |
| 380       | 13932            | 0.0              | 510       | 298987           | 102.7            | 640       | 366414           | 43.8             | 770       | 17366            | 0.0              | 900       | 14656            | 0.0              |
| 385       | 13265            | 0.0              | 515       | 348170           | 144.2            | 645       | 331272           | 31.9             | 775       | 16226            | 0.0              | 905       | 11999            | 0.0              |
| 390       | 11808            | 0.0              | 520       | 390427           | 189.3            | 650       | 297360           | 21.7             | 780       | 14803            | 0.0              | 910       | 12965            | 0.0              |
| 395       | 10395            | 0.0              | 525       | 421211           | 226.1            | 655       | 263291           | 15.1             | 785       | 15199            | 0.0              | 915       | 15939            | 0.0              |
| 400       | 9348             | 0.0              | 530       | 446063           | 262.6            | 660       | 232931           | 9.7              | 790       | 12989            | 0.0              | 920       | 16238            | 0.0              |
| 405       | 9479             | 0.0              | 535       | 465110           | 288.4            | 665       | 204719           | 6.5              | 795       | 12106            | 0.0              | 925       | 14419            | 0.0              |
| 410       | 12414            | 0.0              | 540       | 479189           | 312.2            | 670       | 177096           | 3.9              | 800       | 12942            | 0.0              | 930       | 14788            | 0.0              |
| 415       | 21574            | 0.0              | 545       | 495864           | 330.0            | 675       | 153254           | 2.6              | 805       | 13253            | 0.0              | 935       | 18619            | 0.0              |
| 420       | 41448            | 0.1              | 550       | 516625           | 351.1            | 680       | 132874           | 1.5              | 810       | 12808            | 0.0              | 940       | 13995            | 0.0              |
| 425       | 79385            | 0.4              | 555       | 538555           | 367.8            | 685       | 115378           | 1.0              | 815       | 12903            | 0.0              | 945       | 18047            | 0.0              |
| 430       | 141845           | 1.1              | 560       | 562412           | 382.2            | 690       | 100157           | 0.6              | 820       | 12621            | 0.0              | 950       | 21418            | 0.0              |
| 435       | 231290           | 2.7              | 565       | 585835           | 389.5            | 695       | 85561            | 0.4              | 825       | 13903            | 0.0              | 955       | 23138            | 0.0              |
| 440       | 374482           | 5.9              | 570       | 608681           | 395.8            | 700       | 75396            | 0.2              | 830       | 11870            | 0.0              | 960       | 13665            | 0.0              |
| 445       | 596715           | 12.4             | 575       | 629563           | 391.7            | 705       | 65658            | 0.1              | 835       | 11069            | 0.0              | 965       | 14793            | 0.0              |
| 450       | 719656           | 18.7             | 580       | 646820           | 384.3            | 710       | 58172            | 0.1              | 840       | 15291            | 0.0              | 970       | 14396            | 0.0              |
| 455       | 530438           | 17.8             | 585       | 659231           | 366.3            | 715       | 52563            | 0.1              | 845       | 15125            | 0.0              | 975       | 11155            | 0.0              |
| 460       | 330446           | 13.5             | 590       | 665630           | 344.2            | 720       | 47085            | 0.0              | 850       | 15336            | 0.0              | 980       | 17987            | 0.0              |
| 465       | 241999           | 12.5             | 595       | 656228           | 311.1            | 725       | 41741            | 0.0              | 855       | 15791            | 0.0              | 985       | 16185            | 0.0              |
| 470       | 167096           | 10.4             | 600       | 646946           | 278.8            | 730       | 37415            | 0.0              | 860       | 14660            | 0.0              | 990       | 22120            | 0.0              |
| 475       | 113791           | 8.9              | 605       | 628643           | 243.4            | 735       | 32125            | 0.0              | 865       | 12528            | 0.0              | 995       | 11943            | 0.0              |
| 480       | 96126            | 9.1              | 610       | 599057           | 205.8            | 740       | 29322            | 0.0              | 870       | 14089            | 0.0              | 1000      | 16020            | 0.0              |
| 485       | 94467            | 11.2             | 615       | 565669           | 170.8            | 745       | 26862            | 0.0              | 875       | 11732            | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 54268.8**
**S/P: 1.5**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 13329                         | 0.0                            | 490               | 105235                        | 162.0                          | 620               | 524343                        | 6.6                            | 750               | 24224                         | 0.0                            | 880               | 16135                         | 0.0                            |
| 365               | 11697                         | 0.0                            | 495               | 137678                        | 222.6                          | 625               | 488932                        | 4.1                            | 755               | 22376                         | 0.0                            | 885               | 16876                         | 0.0                            |
| 370               | 10917                         | 0.0                            | 500               | 186689                        | 312.3                          | 630               | 445400                        | 2.5                            | 760               | 20109                         | 0.0                            | 890               | 13554                         | 0.0                            |
| 375               | 12548                         | 0.0                            | 505               | 244611                        | 415.8                          | 635               | 403534                        | 1.5                            | 765               | 18097                         | 0.0                            | 895               | 11525                         | 0.0                            |
| 380               | 13932                         | 0.0                            | 510               | 298987                        | 506.8                          | 640               | 366414                        | 0.9                            | 770               | 17366                         | 0.0                            | 900               | 14656                         | 0.0                            |
| 385               | 13265                         | 0.0                            | 515               | 348170                        | 577.1                          | 645               | 331272                        | 0.6                            | 775               | 16226                         | 0.0                            | 905               | 11999                         | 0.0                            |
| 390               | 11808                         | 0.0                            | 520               | 390427                        | 620.6                          | 650               | 297360                        | 0.3                            | 780               | 14803                         | 0.0                            | 910               | 12965                         | 0.0                            |
| 395               | 10395                         | 0.1                            | 525               | 421211                        | 630.1                          | 655               | 263291                        | 0.2                            | 785               | 15199                         | 0.0                            | 915               | 15939                         | 0.0                            |
| 400               | 9348                          | 0.1                            | 530               | 446063                        | 615.0                          | 660               | 232931                        | 0.1                            | 790               | 12989                         | 0.0                            | 920               | 16238                         | 0.0                            |
| 405               | 9479                          | 0.3                            | 535               | 465110                        | 579.6                          | 665               | 204719                        | 0.1                            | 795               | 12106                         | 0.0                            | 925               | 14419                         | 0.0                            |
| 410               | 12414                         | 0.7                            | 540               | 479189                        | 529.5                          | 670               | 177096                        | 0.0                            | 800               | 12942                         | 0.0                            | 930               | 14788                         | 0.0                            |
| 415               | 21574                         | 2.2                            | 545               | 495864                        | 475.4                          | 675               | 153254                        | 0.0                            | 805               | 13253                         | 0.0                            | 935               | 18619                         | 0.0                            |
| 420               | 41448                         | 6.8                            | 550               | 516625                        | 422.4                          | 680               | 132874                        | 0.0                            | 810               | 12808                         | 0.0                            | 940               | 13995                         | 0.0                            |
| 425               | 79385                         | 19.4                           | 555               | 538555                        | 368.0                          | 685               | 115378                        | 0.0                            | 815               | 12903                         | 0.0                            | 945               | 18047                         | 0.0                            |
| 430               | 141845                        | 48.3                           | 560               | 562412                        | 314.4                          | 690               | 100157                        | 0.0                            | 820               | 12621                         | 0.0                            | 950               | 21418                         | 0.0                            |
| 435               | 231290                        | 103.4                          | 565               | 585835                        | 262.8                          | 695               | 85561                         | 0.0                            | 825               | 13903                         | 0.0                            | 955               | 23138                         | 0.0                            |
| 440               | 374482                        | 209.3                          | 570               | 608681                        | 214.8                          | 700               | 75396                         | 0.0                            | 830               | 11870                         | 0.0                            | 960               | 13665                         | 0.0                            |
| 445               | 596715                        | 399.6                          | 575               | 629563                        | 171.5                          | 705               | 65658                         | 0.0                            | 835               | 11069                         | 0.0                            | 965               | 14793                         | 0.0                            |
| 450               | 719656                        | 557.8                          | 580               | 646820                        | 133.3                          | 710               | 58172                         | 0.0                            | 840               | 15291                         | 0.0                            | 970               | 14396                         | 0.0                            |
| 455               | 530438                        | 463.5                          | 585               | 659231                        | 100.8                          | 715               | 52563                         | 0.0                            | 845               | 15125                         | 0.0                            | 975               | 11155                         | 0.0                            |
| 460               | 330446                        | 319.2                          | 590               | 665630                        | 74.1                           | 720               | 47085                         | 0.0                            | 850               | 15336                         | 0.0                            | 980               | 17987                         | 0.0                            |
| 465               | 241999                        | 255.6                          | 595               | 656228                        | 52.3                           | 725               | 41741                         | 0.0                            | 855               | 15791                         | 0.0                            | 985               | 16185                         | 0.0                            |
| 470               | 167096                        | 192.4                          | 600               | 646946                        | 36.5                           | 730               | 37415                         | 0.0                            | 860               | 14660                         | 0.0                            | 990               | 22120                         | 0.0                            |
| 475               | 113791                        | 142.3                          | 605               | 628643                        | 24.7                           | 735               | 32125                         | 0.0                            | 865               | 12528                         | 0.0                            | 995               | 11943                         | 0.0                            |
| 480               | 96126                         | 129.8                          | 610               | 599057                        | 16.2                           | 740               | 29322                         | 0.0                            | 870               | 14089                         | 0.0                            | 1000              | 16020                         | 0.0                            |
| 485               | 94467                         | 136.9                          | 615               | 565669                        | 10.5                           | 745               | 26862                         | 0.0                            | 875               | 11732                         | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 20938.3**      **M/P: 0.58**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 13329            | 0.0              | 490       | 105235           | 87.6             | 620       | 524343           | 0.4              | 750       | 24224            | 0.0              | 880       | 16135            | 0.0              |
| 365       | 11697            | 0.0              | 495       | 137678           | 113.7            | 625       | 488932           | 0.3              | 755       | 22376            | 0.0              | 885       | 16876            | 0.0              |
| 370       | 10917            | 0.0              | 500       | 186689           | 150.1            | 630       | 445400           | 0.2              | 760       | 20109            | 0.0              | 890       | 13554            | 0.0              |
| 375       | 12548            | 0.0              | 505       | 244611           | 187.7            | 635       | 403534           | 0.1              | 765       | 18097            | 0.0              | 895       | 11525            | 0.0              |
| 380       | 13932            | 0.0              | 510       | 298987           | 214.7            | 640       | 366414           | 0.1              | 770       | 17366            | 0.0              | 900       | 14656            | 0.0              |
| 385       | 13265            | 0.0              | 515       | 348170           | 227.5            | 645       | 331272           | 0.0              | 775       | 16226            | 0.0              | 905       | 11999            | 0.0              |
| 390       | 11808            | 0.0              | 520       | 390427           | 227.3            | 650       | 297360           | 0.0              | 780       | 14803            | 0.0              | 910       | 12965            | 0.0              |
| 395       | 10395            | 0.1              | 525       | 421211           | 213.6            | 655       | 263291           | 0.0              | 785       | 15199            | 0.0              | 915       | 15939            | 0.0              |
| 400       | 9348             | 0.1              | 530       | 446063           | 192.8            | 660       | 232931           | 0.0              | 790       | 12989            | 0.0              | 920       | 16238            | 0.0              |
| 405       | 9479             | 0.2              | 535       | 465110           | 167.4            | 665       | 204719           | 0.0              | 795       | 12106            | 0.0              | 925       | 14419            | 0.0              |
| 410       | 12414            | 0.5              | 540       | 479189           | 140.2            | 670       | 177096           | 0.0              | 800       | 12942            | 0.0              | 930       | 14788            | 0.0              |
| 415       | 21574            | 1.4              | 545       | 495864           | 115.2            | 675       | 153254           | 0.0              | 805       | 13253            | 0.0              | 935       | 18619            | 0.0              |
| 420       | 41448            | 4.7              | 550       | 516625           | 92.7             | 680       | 132874           | 0.0              | 810       | 12808            | 0.0              | 940       | 13995            | 0.0              |
| 425       | 79385            | 12.4             | 555       | 538555           | 72.6             | 685       | 115378           | 0.0              | 815       | 12903            | 0.0              | 945       | 18047            | 0.0              |
| 430       | 141845           | 30.0             | 560       | 562412           | 55.5             | 690       | 100157           | 0.0              | 820       | 12621            | 0.0              | 950       | 21418            | 0.0              |
| 435       | 231290           | 61.7             | 565       | 585835           | 41.1             | 695       | 85561            | 0.0              | 825       | 13903            | 0.0              | 955       | 23138            | 0.0              |
| 440       | 374482           | 125.1            | 570       | 608681           | 29.7             | 700       | 75396            | 0.0              | 830       | 11870            | 0.0              | 960       | 13665            | 0.0              |
| 445       | 596715           | 235.4            | 575       | 629563           | 21.0             | 705       | 65658            | 0.0              | 835       | 11069            | 0.0              | 965       | 14793            | 0.0              |
| 450       | 719656           | 331.6            | 580       | 646820           | 14.5             | 710       | 58172            | 0.0              | 840       | 15291            | 0.0              | 970       | 14396            | 0.0              |
| 455       | 530438           | 277.9            | 585       | 659231           | 9.8              | 715       | 52563            | 0.0              | 845       | 15125            | 0.0              | 975       | 11155            | 0.0              |
| 460       | 330446           | 194.7            | 590       | 665630           | 6.5              | 720       | 47085            | 0.0              | 850       | 15336            | 0.0              | 980       | 17987            | 0.0              |
| 465       | 241999           | 158.1            | 595       | 656228           | 4.2              | 725       | 41741            | 0.0              | 855       | 15791            | 0.0              | 985       | 16185            | 0.0              |
| 470       | 167096           | 119.6            | 600       | 646946           | 2.7              | 730       | 37415            | 0.0              | 860       | 14660            | 0.0              | 990       | 22120            | 0.0              |
| 475       | 113791           | 86.9             | 605       | 628643           | 1.7              | 735       | 32125            | 0.0              | 865       | 12528            | 0.0              | 995       | 11943            | 0.0              |
| 480       | 96126            | 77.2             | 610       | 599057           | 1.1              | 740       | 29322            | 0.0              | 870       | 14089            | 0.0              | 1000      | 16020            | 0.0              |
| 485       | 94467            | 77.9             | 615       | 565669           | 0.7              | 745       | 26862            | 0.0              | 875       | 11732            | 0.0              |           |                  |                  |

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TM-30-18

### Summary

$R_f = 76.5$   
 $R_g = 95.6$   
 CIE  $R_a = 75.1$   
 $R_g = -19.0$

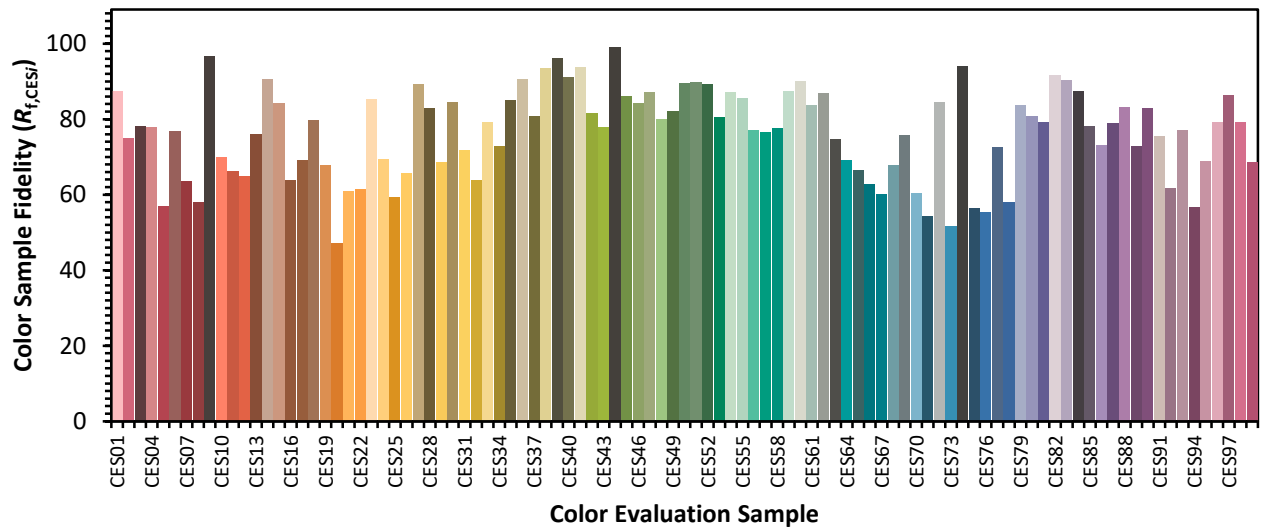


### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 66 | CES51 = 90 | CES76 = 56 |
| CES02 = 61 | CES27 = 89 | CES52 = 89 | CES77 = 73 |
| CES03 = 31 | CES28 = 83 | CES53 = 81 | CES78 = 58 |
| CES04 = 70 | CES29 = 69 | CES54 = 87 | CES79 = 84 |
| CES05 = 48 | CES30 = 84 | CES55 = 86 | CES80 = 81 |
| CES06 = 51 | CES31 = 72 | CES56 = 77 | CES81 = 79 |
| CES07 = 40 | CES32 = 64 | CES57 = 77 | CES82 = 92 |
| CES08 = 39 | CES33 = 79 | CES58 = 77 | CES83 = 90 |
| CES09 = 29 | CES34 = 73 | CES59 = 87 | CES84 = 87 |
| CES10 = 74 | CES35 = 85 | CES60 = 90 | CES85 = 78 |
| CES11 = 57 | CES36 = 91 | CES61 = 84 | CES86 = 73 |
| CES12 = 63 | CES37 = 81 | CES62 = 87 | CES87 = 79 |
| CES13 = 42 | CES38 = 94 | CES63 = 75 | CES88 = 83 |
| CES14 = 74 | CES39 = 96 | CES64 = 69 | CES89 = 73 |
| CES15 = 71 | CES40 = 91 | CES65 = 66 | CES90 = 83 |
| CES16 = 47 | CES41 = 94 | CES66 = 63 | CES91 = 76 |
| CES17 = 49 | CES42 = 82 | CES67 = 60 | CES92 = 62 |
| CES18 = 56 | CES43 = 78 | CES68 = 68 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 76 | CES94 = 57 |
| CES20 = 65 | CES45 = 86 | CES70 = 60 | CES95 = 69 |
| CES21 = 86 | CES46 = 84 | CES71 = 54 | CES96 = 79 |
| CES22 = 78 | CES47 = 87 | CES72 = 85 | CES97 = 86 |
| CES23 = 92 | CES48 = 80 | CES73 = 52 | CES98 = 79 |
| CES24 = 91 | CES49 = 82 | CES74 = 94 | CES99 = 69 |
| CES25 = 72 | CES50 = 90 | CES75 = 56 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)