

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: P510466

Luminaire Tested: **CTN-CA10-310-727-U-T2-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510466  
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-CA10-310-727-U-T2-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (10) 2700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 37342 lumens  
Efficiency: N/A  
Efficacy: 119.5 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G4

Input Watts (W): 312.4  
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

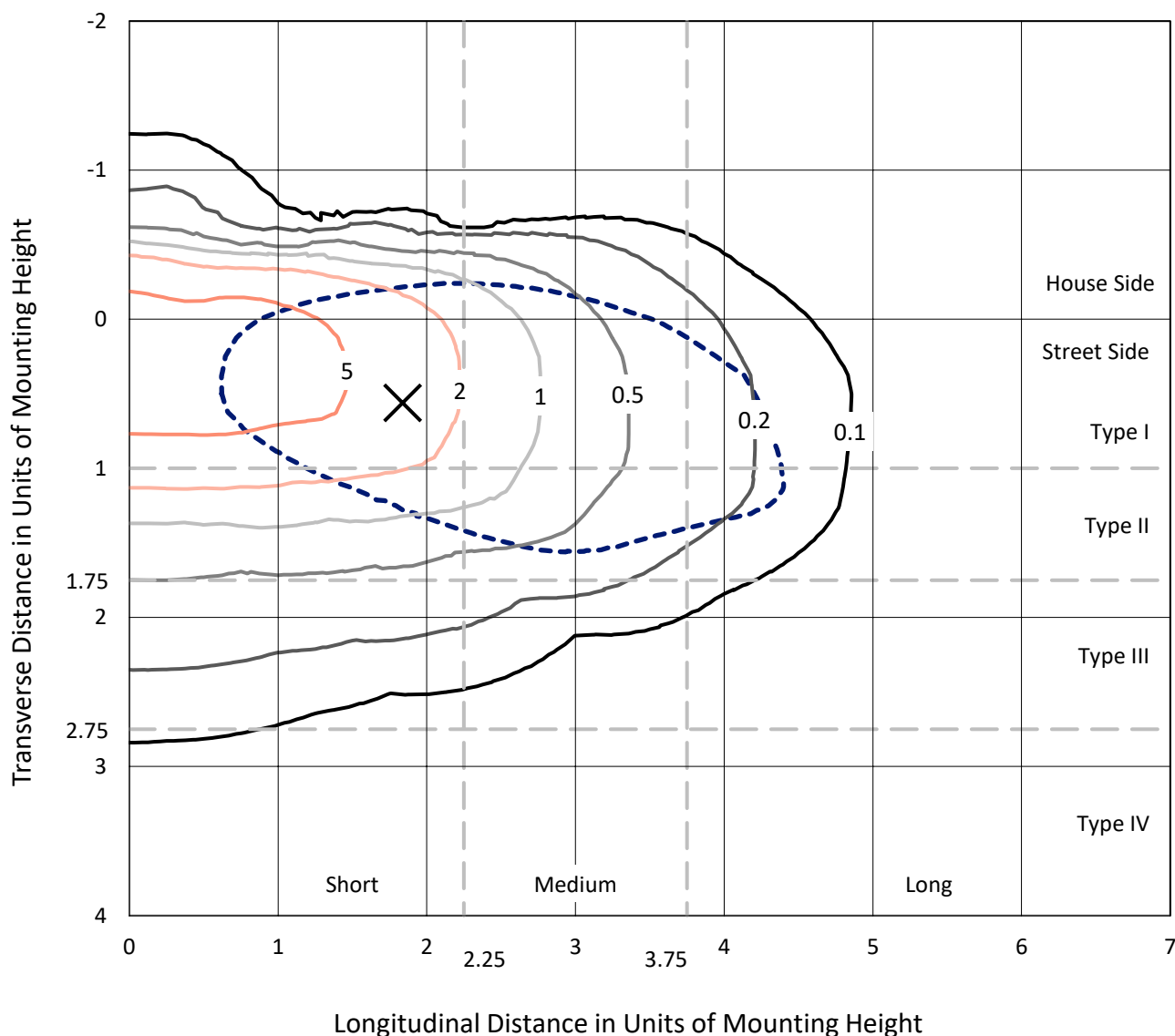


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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

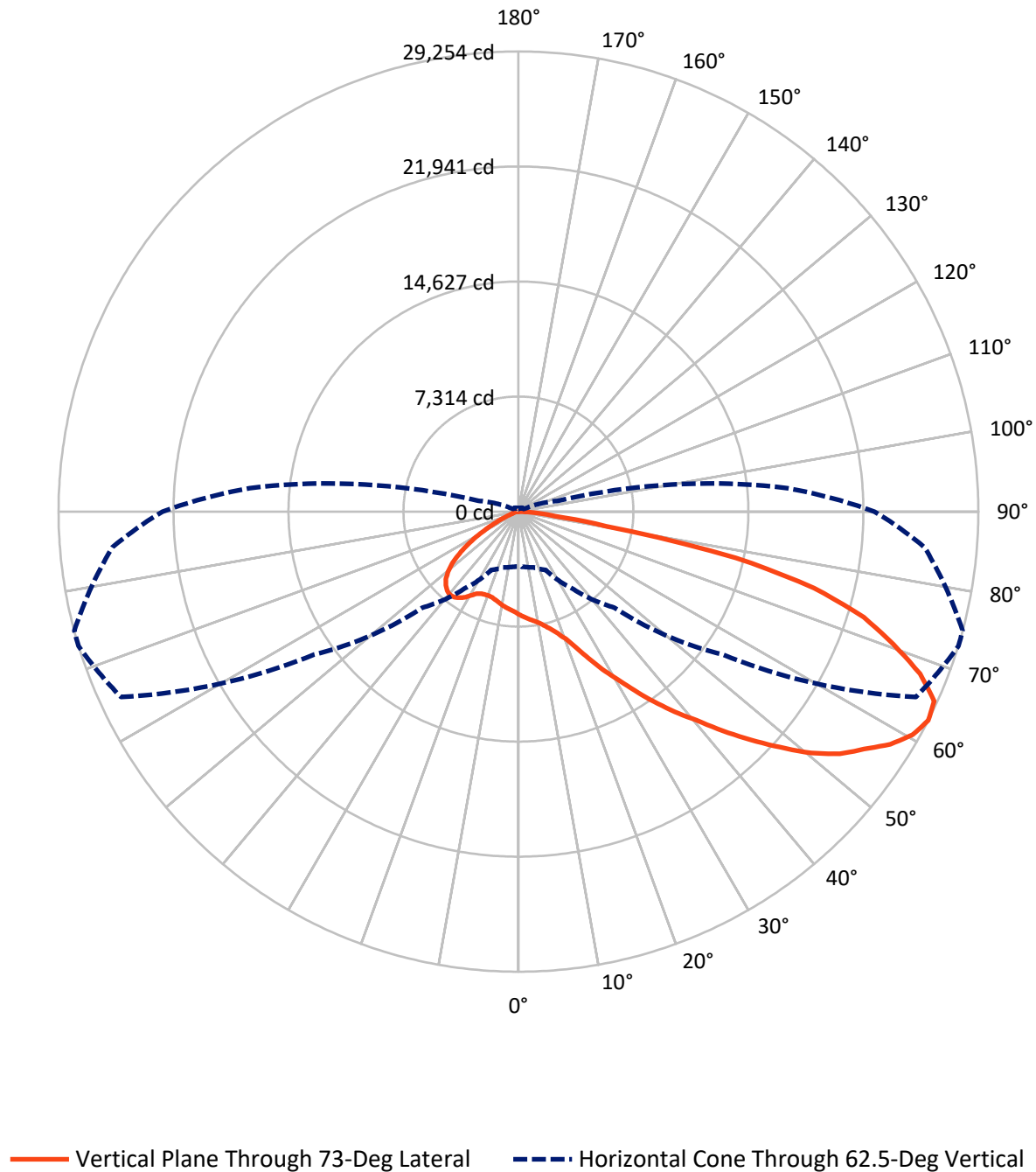
--- 1/2 Max cd



Based on 30 foot mounting height. Maximum calculated value = 9.1 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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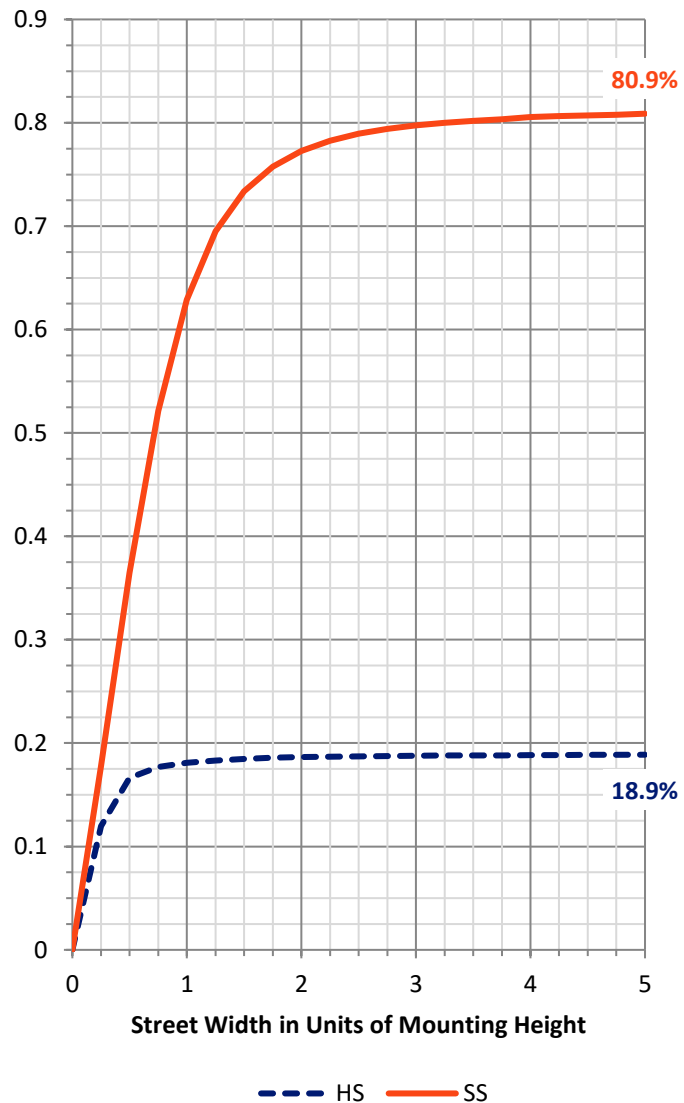
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 7143.3   | 0.0    | 7143.3  |
|                    | % Fixture | 19.1     | 0.0    | 19.1    |
| <b>Street Side</b> | Lumens    | 30198.7  | 0.0    | 30198.7 |
|                    | % Fixture | 80.9     | 0.0    | 80.9    |
| <b>Total</b>       | Lumens    | 37342.0  | 0.0    | 37342.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 625.5   | 1.7       |
| 10°-20°   | 1881.4  | 5.0       |
| 20°-30°   | 3250.6  | 8.7       |
| 30°-40°   | 4888.2  | 13.1      |
| 40°-50°   | 6517.9  | 17.5      |
| 50°-60°   | 7676.1  | 20.6      |
| 60°-70°   | 7631.4  | 20.4      |
| 70°-80°   | 4381.4  | 11.7      |
| 80°-90°   | 489.4   | 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°    | 37342.0 | 100.0     |
| 0°-180°   | 37342.0 | 100.0     |

**Coefficient of Utilization**



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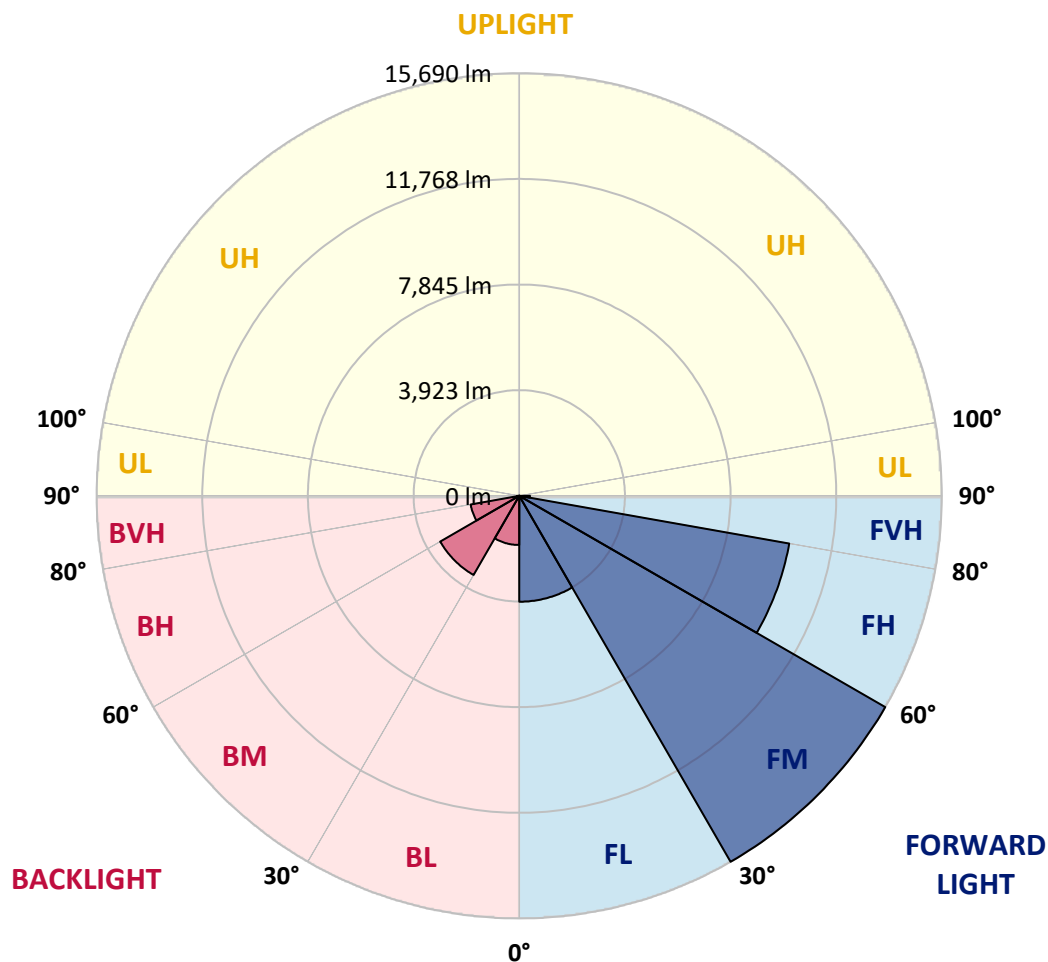
CATALOG NUMBER: CTN-CA10-310-727-U-T2-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 3932.1  | 10.5      |                         |      |          |
| FM   | (30°-60°)   | 15690.2 | 42.0      |                         |      |          |
| FH   | (60°-80°)   | 10178.9 | 27.3      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 397.5   | 1.1       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1825.5  | 4.9       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 3392.0  | 9.1       | B3/5000                 |      |          |
| BH   | (60°-80°)   | 1834.0  | 4.9       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 91.9    | 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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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 73°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 6548.9  | 6548.9  | 6548.9  | 6548.9  | 6548.9  | 6548.9  | 6548.9  | 6548.9  | 6548.9  | 6548.9  | 6548.9  |
| 2.5°  | 7006.6  | 7024.2  | 7003.2  | 6994.0  | 6984.0  | 6918.6  | 6842.3  | 6764.4  | 6701.5  | 6691.4  | 6609.3  |
| 5°    | 7498.6  | 7507.8  | 7473.5  | 7434.1  | 7366.2  | 7258.1  | 7121.4  | 6986.5  | 6860.8  | 6827.2  | 6677.2  |
| 7.5°  | 7876.7  | 7859.1  | 7850.7  | 7817.1  | 7757.6  | 7638.6  | 7431.6  | 7210.3  | 7015.8  | 6968.9  | 6740.9  |
| 10°   | 8231.2  | 8223.7  | 8160.0  | 8118.1  | 8023.3  | 7913.5  | 7743.4  | 7462.6  | 7188.5  | 7113.1  | 6796.2  |
| 12.5° | 8615.1  | 8598.4  | 8572.4  | 8481.8  | 8404.7  | 8219.5  | 8014.1  | 7758.5  | 7453.4  | 7352.8  | 6890.9  |
| 15°   | 8960.5  | 8915.2  | 8901.0  | 8806.2  | 8728.3  | 8586.6  | 8380.4  | 8083.7  | 7757.6  | 7671.3  | 7071.1  |
| 17.5° | 9289.0  | 9268.1  | 9236.2  | 9171.7  | 9084.5  | 8975.6  | 8810.4  | 8492.7  | 8155.8  | 8030.1  | 7377.1  |
| 20°   | 9568.2  | 9542.2  | 9514.5  | 9532.1  | 9512.8  | 9443.3  | 9339.3  | 9068.6  | 8657.0  | 8535.5  | 7749.3  |
| 22.5° | 9762.6  | 9761.8  | 9872.4  | 9937.0  | 9973.9  | 9971.3  | 9946.2  | 9792.8  | 9378.7  | 9255.5  | 8305.8  |
| 25°   | 9924.4  | 9937.0  | 10077.0 | 10322.6 | 10542.2 | 10562.3 | 10740.0 | 10667.1 | 10315.0 | 10186.8 | 9143.2  |
| 27.5° | 9972.2  | 9997.3  | 10251.3 | 10637.7 | 10971.3 | 11291.5 | 11552.2 | 11685.5 | 11359.4 | 11206.0 | 10043.4 |
| 30°   | 10006.6 | 10016.6 | 10265.6 | 10728.3 | 11431.5 | 11938.6 | 12404.7 | 12630.2 | 12349.4 | 12237.0 | 11046.8 |
| 32.5° | 9764.3  | 9767.7  | 10149.0 | 10849.8 | 11769.3 | 12648.6 | 13200.1 | 13625.1 | 13551.3 | 13403.0 | 12144.0 |
| 35°   | 9430.7  | 9492.7  | 9930.3  | 10732.4 | 12047.6 | 13300.7 | 14051.8 | 14685.4 | 14833.0 | 14726.5 | 13240.4 |
| 37.5° | 9018.3  | 9066.9  | 9535.5  | 10558.1 | 12108.8 | 13749.2 | 14713.9 | 15763.4 | 16149.0 | 16131.4 | 14563.9 |
| 40°   | 8511.2  | 8570.7  | 9131.5  | 10182.6 | 12078.6 | 14075.2 | 15491.0 | 16957.0 | 17446.5 | 17391.2 | 15876.5 |
| 42.5° | 7911.9  | 7999.0  | 8543.0  | 9699.8  | 11858.2 | 14274.7 | 16127.2 | 18172.4 | 19053.4 | 19017.3 | 17038.3 |
| 45°   | 7319.3  | 7366.2  | 7862.4  | 9027.5  | 11452.5 | 14339.3 | 16725.6 | 19847.1 | 20701.3 | 20661.0 | 18438.1 |
| 47.5° | 6708.2  | 6749.3  | 7267.3  | 8319.2  | 10748.4 | 14209.3 | 17199.2 | 21285.5 | 22380.2 | 22340.0 | 19828.7 |
| 50°   | 5286.6  | 5441.7  | 6503.7  | 7696.4  | 9946.2  | 13841.4 | 17646.0 | 23077.6 | 24137.1 | 23966.1 | 21046.6 |
| 52.5° | 4523.0  | 4579.1  | 5129.8  | 7068.6  | 9145.7  | 13213.5 | 17944.4 | 24738.1 | 25582.2 | 25335.7 | 22292.2 |
| 55°   | 4227.9  | 4265.7  | 4535.6  | 5911.1  | 8393.8  | 12263.9 | 18295.6 | 26402.8 | 26666.0 | 26603.1 | 23308.1 |
| 57.5° | 4004.1  | 4046.0  | 4238.8  | 4937.1  | 7601.7  | 10932.8 | 18185.8 | 27573.8 | 27903.2 | 27702.0 | 24386.9 |
| 60°   | 3687.3  | 3738.4  | 3994.1  | 4432.5  | 6701.5  | 9581.6  | 17219.4 | 28053.2 | 28802.6 | 28576.3 | 25207.5 |
| 62.5° | 3487.8  | 3521.3  | 3668.0  | 4093.0  | 5955.5  | 8631.1  | 15843.8 | 27899.0 | 29254.4 | 29246.0 | 25919.1 |
| 65°   | 3217.1  | 3266.5  | 3423.3  | 3767.8  | 5291.6  | 7894.3  | 14546.3 | 27137.1 | 29059.9 | 29067.5 | 26065.8 |
| 67.5° | 2933.7  | 2953.9  | 3118.1  | 3394.8  | 4509.6  | 7219.5  | 12867.4 | 25833.6 | 27545.3 | 27717.9 | 25050.8 |
| 70°   | 2580.0  | 2570.0  | 2747.7  | 2949.7  | 3685.6  | 6129.8  | 10356.9 | 23515.1 | 25307.2 | 25378.5 | 22998.0 |
| 72.5° | 2030.1  | 2039.4  | 2088.8  | 2228.8  | 2797.9  | 4823.9  | 7515.4  | 19867.3 | 22967.8 | 23094.4 | 20374.4 |
| 75°   | 1364.6  | 1379.7  | 1610.2  | 1746.8  | 2012.5  | 3466.8  | 4725.8  | 13410.5 | 19416.3 | 19773.4 | 16675.4 |
| 77.5° | 1041.1  | 1050.3  | 1117.3  | 1266.5  | 1456.0  | 2471.0  | 2561.6  | 7307.5  | 14135.6 | 14983.0 | 13045.1 |
| 80°   | 737.6   | 741.0   | 674.8   | 600.2   | 775.3   | 1676.4  | 1513.0  | 3112.3  | 5632.8  | 6656.2  | 7662.1  |
| 82.5° | 330.3   | 325.2   | 383.1   | 318.5   | 446.8   | 648.8   | 714.2   | 1510.5  | 2339.4  | 2514.6  | 2737.6  |
| 85°   | 153.4   | 171.8   | 197.0   | 165.1   | 265.7   | 250.6   | 278.3   | 643.7   | 1096.4  | 1210.4  | 1203.7  |
| 87.5° | 37.7    | 41.1    | 52.0    | 66.2    | 96.4    | 85.5    | 83.8    | 189.4   | 244.8   | 243.9   | 374.7   |
| 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: P510466

CATALOG NUMBER: CTN-CA10-310-727-U-T2-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6548.9  | 6548.9  | 6548.9 | 6548.9 | 6548.9 | 6548.9 | 6548.9 | 6548.9 | 6548.9 | 6548.9 | 6548.9 |
| 2.5°  | 6553.1  | 6509.5  | 6406.4 | 6306.7 | 6212.0 | 6149.1 | 6078.7 | 6004.9 | 5960.5 | 5939.6 | 5984.8 |
| 5°    | 6585.8  | 6502.8  | 6305.9 | 6108.0 | 5940.4 | 5797.1 | 5696.5 | 5611.0 | 5564.9 | 5569.1 | 5571.6 |
| 7.5°  | 6613.5  | 6497.0  | 6221.2 | 5942.1 | 5680.6 | 5502.9 | 5371.3 | 5279.0 | 5226.2 | 5186.0 | 5216.2 |
| 10°   | 6637.8  | 6472.7  | 6122.3 | 5750.1 | 5466.0 | 5202.8 | 5024.2 | 4912.8 | 4815.5 | 4761.0 | 4803.8 |
| 12.5° | 6663.8  | 6463.4  | 6011.6 | 5578.3 | 5210.3 | 4916.1 | 4671.3 | 4560.7 | 4465.1 | 4424.1 | 4450.1 |
| 15°   | 6776.9  | 6498.6  | 5908.5 | 5376.3 | 4958.0 | 4577.5 | 4313.4 | 4177.6 | 4102.2 | 4052.7 | 4063.6 |
| 17.5° | 6971.4  | 6591.7  | 5842.3 | 5165.1 | 4676.4 | 4274.0 | 3932.0 | 3773.6 | 3648.7 | 3613.5 | 3604.3 |
| 20°   | 7248.0  | 6768.5  | 5842.3 | 4986.5 | 4357.0 | 3937.1 | 3543.1 | 3275.7 | 3081.3 | 3008.3 | 3064.5 |
| 22.5° | 7712.4  | 7069.5  | 5900.2 | 4824.7 | 4082.1 | 3587.5 | 3118.1 | 2709.9 | 2447.6 | 2341.1 | 2403.1 |
| 25°   | 8362.0  | 7534.7  | 5994.0 | 4683.1 | 3831.5 | 3185.2 | 2579.2 | 2109.8 | 1820.6 | 1694.0 | 1692.3 |
| 27.5° | 9210.3  | 8246.3  | 6183.5 | 4567.4 | 3531.4 | 2664.7 | 2016.7 | 1564.9 | 1293.4 | 1217.1 | 1228.0 |
| 30°   | 10150.7 | 9017.5  | 6541.4 | 4399.8 | 3166.8 | 2082.1 | 1468.5 | 1150.0 | 958.9  | 858.3  | 860.0  |
| 32.5° | 11057.7 | 9816.3  | 6966.4 | 4290.8 | 2693.2 | 1570.0 | 1046.9 | 820.6  | 701.6  | 642.1  | 651.3  |
| 35°   | 12030.0 | 10505.3 | 7282.4 | 4108.1 | 2137.4 | 1134.9 | 740.1  | 615.2  | 565.8  | 534.8  | 536.5  |
| 37.5° | 13080.3 | 11263.0 | 7542.2 | 3863.3 | 1616.1 | 779.5  | 546.5  | 527.2  | 506.3  | 466.9  | 463.5  |
| 40°   | 14177.5 | 12140.6 | 7697.3 | 3467.7 | 1123.2 | 539.8  | 464.4  | 486.2  | 474.4  | 423.3  | 419.1  |
| 42.5° | 15107.9 | 12817.9 | 7735.8 | 2943.8 | 726.7  | 437.5  | 420.8  | 454.3  | 456.8  | 404.9  | 398.1  |
| 45°   | 16001.4 | 13421.4 | 7660.4 | 2253.9 | 503.8  | 411.6  | 394.0  | 440.1  | 443.4  | 396.5  | 385.6  |
| 47.5° | 17001.4 | 14247.1 | 7523.8 | 1503.7 | 416.6  | 388.9  | 384.7  | 416.6  | 428.3  | 389.8  | 376.4  |
| 50°   | 18216.0 | 14918.5 | 7118.9 | 923.7  | 393.1  | 374.7  | 374.7  | 394.0  | 409.9  | 376.4  | 369.7  |
| 52.5° | 19461.6 | 15503.5 | 6519.6 | 633.7  | 378.9  | 359.6  | 370.5  | 378.9  | 384.7  | 354.6  | 360.4  |
| 55°   | 20354.3 | 16022.4 | 5626.1 | 509.6  | 370.5  | 349.5  | 375.5  | 358.8  | 350.4  | 324.4  | 318.5  |
| 57.5° | 21345.0 | 16639.3 | 4712.4 | 451.8  | 359.6  | 355.4  | 358.8  | 326.9  | 303.4  | 276.6  | 270.7  |
| 60°   | 22036.5 | 16971.2 | 3594.2 | 425.0  | 347.0  | 349.5  | 331.1  | 288.3  | 245.6  | 226.3  | 222.1  |
| 62.5° | 22640.1 | 17160.7 | 2634.5 | 390.6  | 335.3  | 334.4  | 300.1  | 246.4  | 202.0  | 181.1  | 177.7  |
| 65°   | 22548.7 | 16864.8 | 1707.4 | 362.9  | 326.1  | 315.2  | 269.1  | 211.2  | 168.5  | 152.6  | 150.9  |
| 67.5° | 21543.7 | 15555.5 | 1075.4 | 334.4  | 310.1  | 290.9  | 241.4  | 188.6  | 155.1  | 136.6  | 135.0  |
| 70°   | 19433.9 | 13747.5 | 658.0  | 297.6  | 275.8  | 257.3  | 213.7  | 176.9  | 146.7  | 124.9  | 120.7  |
| 72.5° | 16517.8 | 11774.3 | 465.2  | 262.4  | 240.6  | 218.8  | 181.1  | 168.5  | 140.0  | 112.3  | 109.0  |
| 75°   | 13570.6 | 8673.0  | 389.8  | 228.8  | 205.4  | 176.0  | 154.2  | 156.7  | 131.6  | 102.3  | 99.7   |
| 77.5° | 9556.4  | 5407.3  | 362.9  | 186.9  | 161.8  | 140.0  | 133.3  | 143.3  | 120.7  | 93.9   | 91.4   |
| 80°   | 5577.5  | 3036.8  | 300.1  | 147.5  | 121.5  | 108.1  | 111.5  | 121.5  | 105.6  | 84.7   | 81.3   |
| 82.5° | 2251.4  | 1202.0  | 211.2  | 114.8  | 88.9   | 86.3   | 91.4   | 98.9   | 87.2   | 71.2   | 69.6   |
| 85°   | 803.8   | 375.5   | 119.9  | 75.4   | 57.0   | 59.5   | 58.7   | 70.4   | 62.9   | 52.0   | 51.1   |
| 87.5° | 211.2   | 74.6    | 53.6   | 30.2   | 24.3   | 24.3   | 22.6   | 32.7   | 30.2   | 23.5   | 26.0   |
| 90°   | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-5

Luminaire Tested: CST-CA6-230-727-U-T4

Test Date: 04/22/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-5  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/22/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA6-230-727-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2613    | CRI (Ra): | 72.6 |      |       |
| CIE u':                   | 0.2668  | R1:       | 69.4 | R9:  | -28.6 |
| CIE v':                   | 0.5272  | R2:       | 84.5 | R10: | 65.5  |
| Duv:                      | -0.0012 | R3:       | 95.0 | R11: | 63.4  |
| CIE x:                    | 0.4648  | R4:       | 67.5 | R12: | 56.9  |
| CIE y:                    | 0.4082  | R5:       | 68.5 | R13: | 72.3  |
| CIE z:                    | 0.1270  | R6:       | 79.7 | R14: | 97.8  |
| Peak Wavelength (nm):     | 603     | R7:       | 75.4 |      |       |
| Dominant Wavelength (nm): | 585     | R8:       | 41.2 |      |       |
| Purity:                   | 62.2    |           |      |      |       |
|                           |         |           |      |      |       |
| Rf:                       | 75.3    |           |      |      |       |
| Rg:                       | 95.8    |           |      |      |       |



### Test Conditions

Stabilization Time: 121M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.5/25%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2104-215-5

| 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 2700K 7-step quadrangle

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### Photopic Flux vs. Wavelength

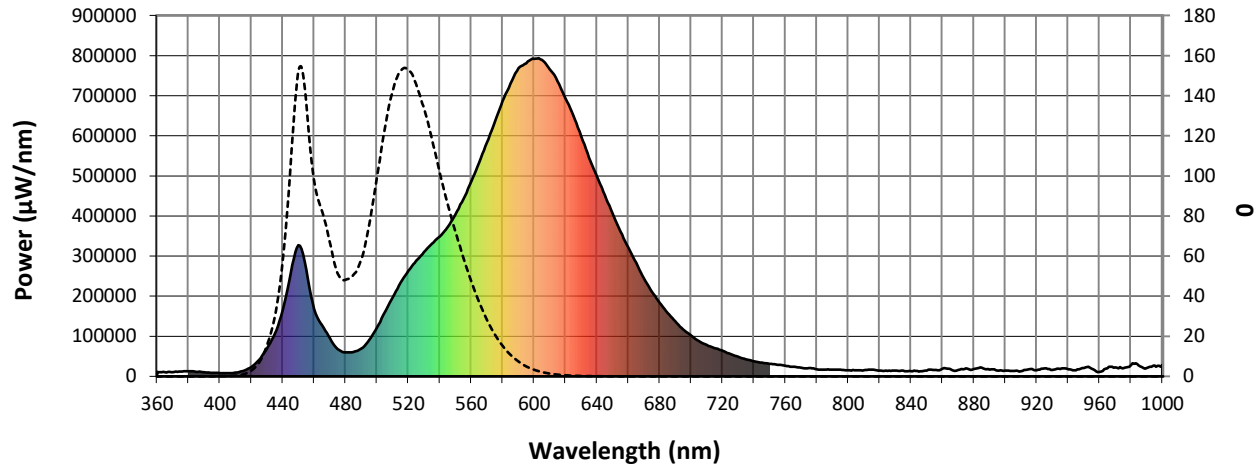


#####

| 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       | 11220            | 0.0              | 490       | 69401            | 9.9              | 620       | 692536           | 180.2            | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 16.3             | 625       | 651217           | 143.7            | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 26.9             | 630       | 598624           | 108.3            | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 44.7             | 635       | 546251           | 82.1             | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 67.7             | 640       | 499000           | 59.6             | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 96.4             | 645       | 451749           | 43.5             | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 127.6            | 650       | 406338           | 29.7             | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.0              | 525       | 288012           | 154.6            | 655       | 360522           | 20.7             | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.0              | 530       | 310825           | 183.0            | 660       | 321663           | 13.4             | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.0              | 535       | 330894           | 205.2            | 665       | 283133           | 9.0              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.0              | 540       | 349086           | 227.5            | 670       | 244093           | 5.3              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 0.0              | 545       | 372506           | 247.9            | 675       | 210996           | 3.5              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 0.1              | 550       | 403721           | 274.3            | 680       | 183942           | 2.1              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 0.2              | 555       | 442032           | 301.9            | 685       | 158373           | 1.4              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 0.6              | 560       | 485515           | 329.9            | 690       | 137120           | 0.8              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 1.3              | 565       | 532962           | 354.4            | 695       | 116757           | 0.5              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 2.6              | 570       | 582457           | 378.7            | 700       | 102093           | 0.3              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 5.3              | 575       | 634550           | 394.8            | 705       | 87819            | 0.2              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 8.5              | 580       | 686476           | 407.9            | 710       | 78011            | 0.1              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 8.9              | 585       | 730571           | 405.9            | 715       | 70264            | 0.1              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 6.9              | 590       | 768228           | 397.2            | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 6.6              | 595       | 780593           | 370.0            | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 5.9              | 600       | 791888           | 341.3            | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 5.3              | 605       | 789088           | 305.6            | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 5.7              | 610       | 765121           | 262.9            | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 7.2              | 615       | 735839           | 222.1            | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

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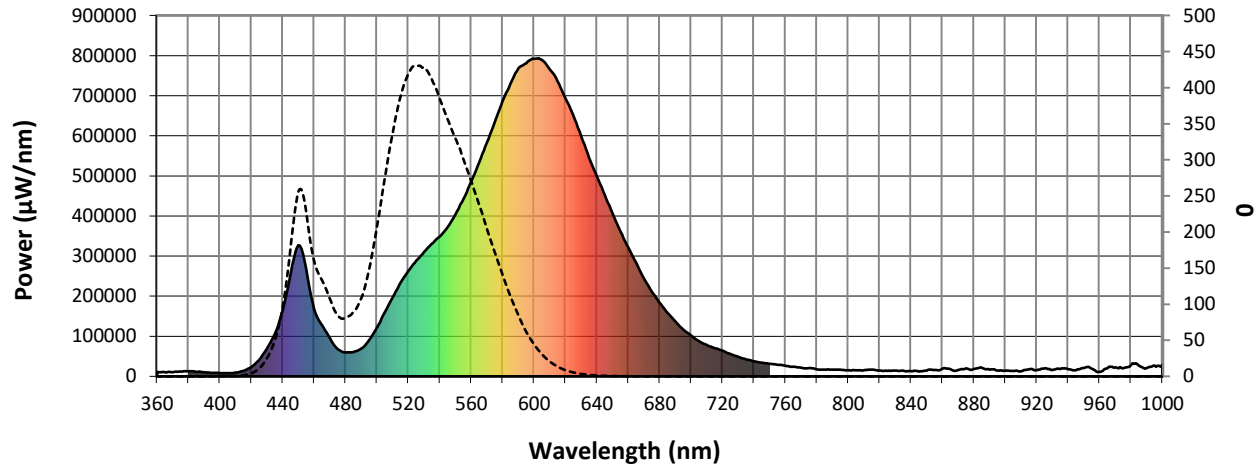
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 37163.1**
**S/P: 1.07**

| 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       | 11220            | 0.0              | 490       | 69401            | 106.9            | 620       | 692536           | 8.7              | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 145.6            | 625       | 651217           | 5.5              | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 204.0            | 630       | 598624           | 3.4              | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 271.4            | 635       | 546251           | 2.1              | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 334.0            | 640       | 499000           | 1.3              | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 385.9            | 645       | 451749           | 0.8              | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 418.3            | 650       | 406338           | 0.5              | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.1              | 525       | 288012           | 430.9            | 655       | 360522           | 0.3              | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.1              | 530       | 310825           | 428.5            | 660       | 321663           | 0.2              | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.2              | 535       | 330894           | 412.3            | 665       | 283133           | 0.1              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.6              | 540       | 349086           | 385.7            | 670       | 244093           | 0.1              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 1.4              | 545       | 372506           | 357.2            | 675       | 210996           | 0.0              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 3.9              | 550       | 403721           | 330.1            | 680       | 183942           | 0.0              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 10.2             | 555       | 442032           | 302.1            | 685       | 158373           | 0.0              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 23.8             | 560       | 485515           | 271.4            | 690       | 137120           | 0.0              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 47.8             | 565       | 532962           | 239.1            | 695       | 116757           | 0.0              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 92.0             | 570       | 582457           | 205.6            | 700       | 102093           | 0.0              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 171.5            | 575       | 634550           | 172.8            | 705       | 87819            | 0.0              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 253.7            | 580       | 686476           | 141.4            | 710       | 78011            | 0.0              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 232.1            | 585       | 730571           | 111.7            | 715       | 70264            | 0.0              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 162.6            | 590       | 768228           | 85.5             | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 134.5            | 595       | 780593           | 62.2             | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 109.1            | 600       | 791888           | 44.6             | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 84.8             | 605       | 789088           | 31.0             | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 80.8             | 610       | 765121           | 20.7             | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 88.5             | 615       | 735839           | 13.6             | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 13012.4**      **M/P: 0.38**

| 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       | 11220            | 0.0              | 490       | 69401            | 57.8             | 620       | 692536           | 0.5              | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 74.3             | 625       | 651217           | 0.3              | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 98.0             | 630       | 598624           | 0.2              | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 122.5            | 635       | 546251           | 0.1              | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 141.5            | 640       | 499000           | 0.1              | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 152.1            | 645       | 451749           | 0.0              | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 153.2            | 650       | 406338           | 0.0              | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.0              | 525       | 288012           | 146.1            | 655       | 360522           | 0.0              | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.1              | 530       | 310825           | 134.3            | 660       | 321663           | 0.0              | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.1              | 535       | 330894           | 119.1            | 665       | 283133           | 0.0              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.4              | 540       | 349086           | 102.2            | 670       | 244093           | 0.0              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 0.9              | 545       | 372506           | 86.5             | 675       | 210996           | 0.0              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 2.7              | 550       | 403721           | 72.5             | 680       | 183942           | 0.0              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 6.5              | 555       | 442032           | 59.6             | 685       | 158373           | 0.0              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 14.8             | 560       | 485515           | 47.9             | 690       | 137120           | 0.0              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 28.5             | 565       | 532962           | 37.4             | 695       | 116757           | 0.0              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 55.0             | 570       | 582457           | 28.5             | 700       | 102093           | 0.0              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 101.0            | 575       | 634550           | 21.1             | 705       | 87819            | 0.0              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 150.8            | 580       | 686476           | 15.4             | 710       | 78011            | 0.0              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 139.2            | 585       | 730571           | 10.9             | 715       | 70264            | 0.0              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 99.2             | 590       | 768228           | 7.5              | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 83.2             | 595       | 780593           | 5.0              | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 67.8             | 600       | 791888           | 3.3              | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 51.8             | 605       | 789088           | 2.2              | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 48.1             | 610       | 765121           | 1.4              | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 50.3             | 615       | 735839           | 0.9              | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

### Summary

$R_f = 75.3$   
 $R_g = 95.8$   
 CIE  $R_a = 72.6$   
 $R_g = -28.6$

### Spectral Power Distribution Comparison



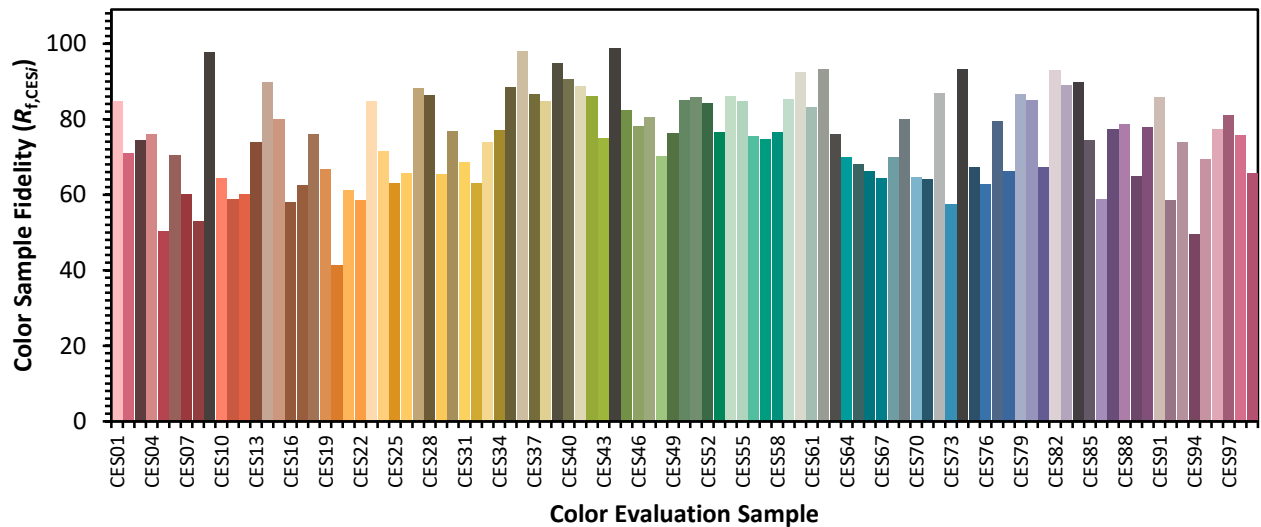
### Color Vector Graphics



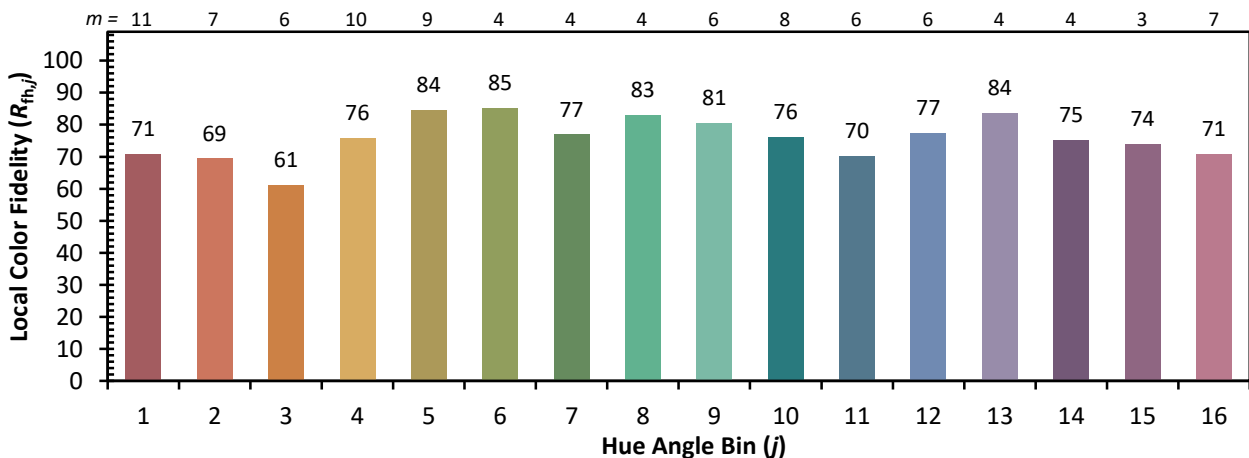
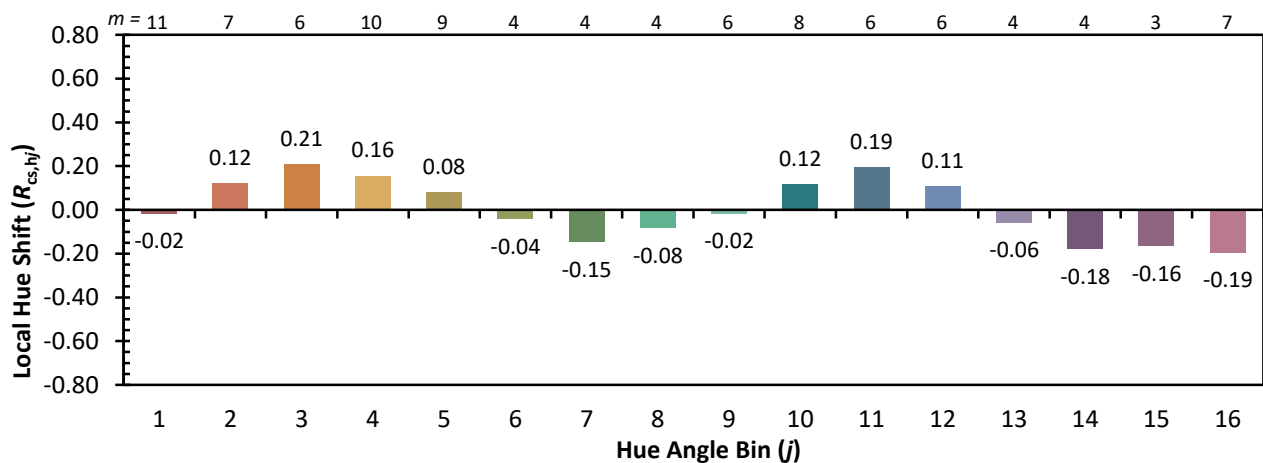
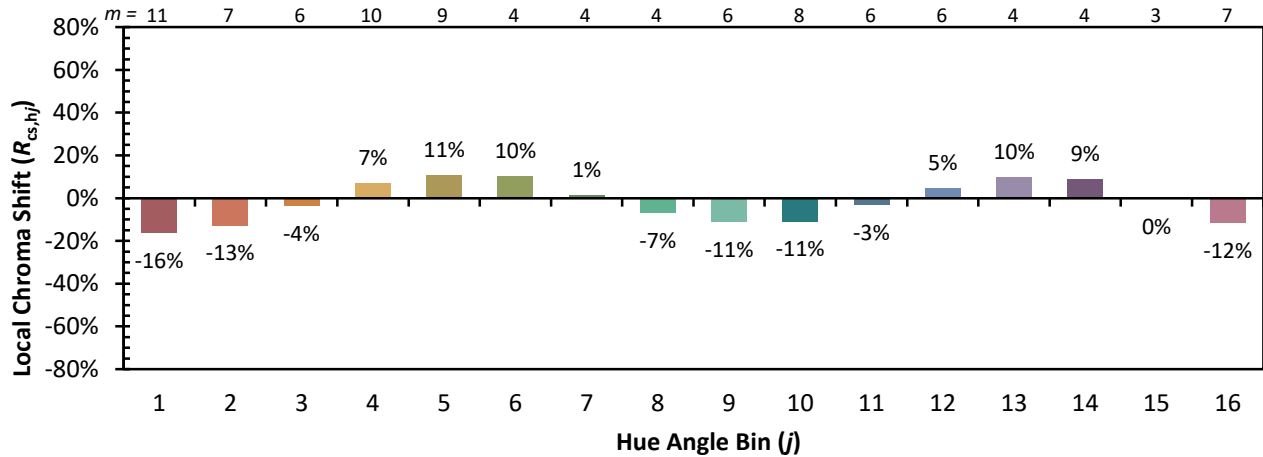


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 66 | CES51 = 86 | CES76 = 63 |
| CES02 = 64 | CES27 = 88 | CES52 = 84 | CES77 = 79 |
| CES03 = 31 | CES28 = 86 | CES53 = 77 | CES78 = 66 |
| CES04 = 71 | CES29 = 65 | CES54 = 86 | CES79 = 87 |
| CES05 = 50 | CES30 = 77 | CES55 = 85 | CES80 = 85 |
| CES06 = 52 | CES31 = 69 | CES56 = 75 | CES81 = 67 |
| CES07 = 42 | CES32 = 63 | CES57 = 75 | CES82 = 93 |
| CES08 = 41 | CES33 = 74 | CES58 = 77 | CES83 = 89 |
| CES09 = 29 | CES34 = 77 | CES59 = 85 | CES84 = 90 |
| CES10 = 77 | CES35 = 88 | CES60 = 92 | CES85 = 74 |
| CES11 = 60 | CES36 = 98 | CES61 = 83 | CES86 = 59 |
| CES12 = 66 | CES37 = 86 | CES62 = 93 | CES87 = 77 |
| CES13 = 44 | CES38 = 85 | CES63 = 76 | CES88 = 79 |
| CES14 = 74 | CES39 = 95 | CES64 = 70 | CES89 = 65 |
| CES15 = 72 | CES40 = 91 | CES65 = 68 | CES90 = 78 |
| CES16 = 48 | CES41 = 89 | CES66 = 66 | CES91 = 86 |
| CES17 = 51 | CES42 = 86 | CES67 = 64 | CES92 = 59 |
| CES18 = 57 | CES43 = 75 | CES68 = 70 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 80 | CES94 = 50 |
| CES20 = 67 | CES45 = 83 | CES70 = 65 | CES95 = 69 |
| CES21 = 88 | CES46 = 78 | CES71 = 64 | CES96 = 77 |
| CES22 = 80 | CES47 = 80 | CES72 = 87 | CES97 = 81 |
| CES23 = 92 | CES48 = 70 | CES73 = 58 | CES98 = 76 |
| CES24 = 91 | CES49 = 76 | CES74 = 93 | CES99 = 66 |
| CES25 = 73 | CES50 = 85 | CES75 = 67 |            |



### Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)