

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: P510596

Luminaire Tested: **CTN-CA10-760-730-U-T2-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510596  
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-CA10-760-730-U-T2-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (10) 3000K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 95202 lumens  
Efficiency: N/A  
Efficacy: 125.0 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B5 - U0 - G5

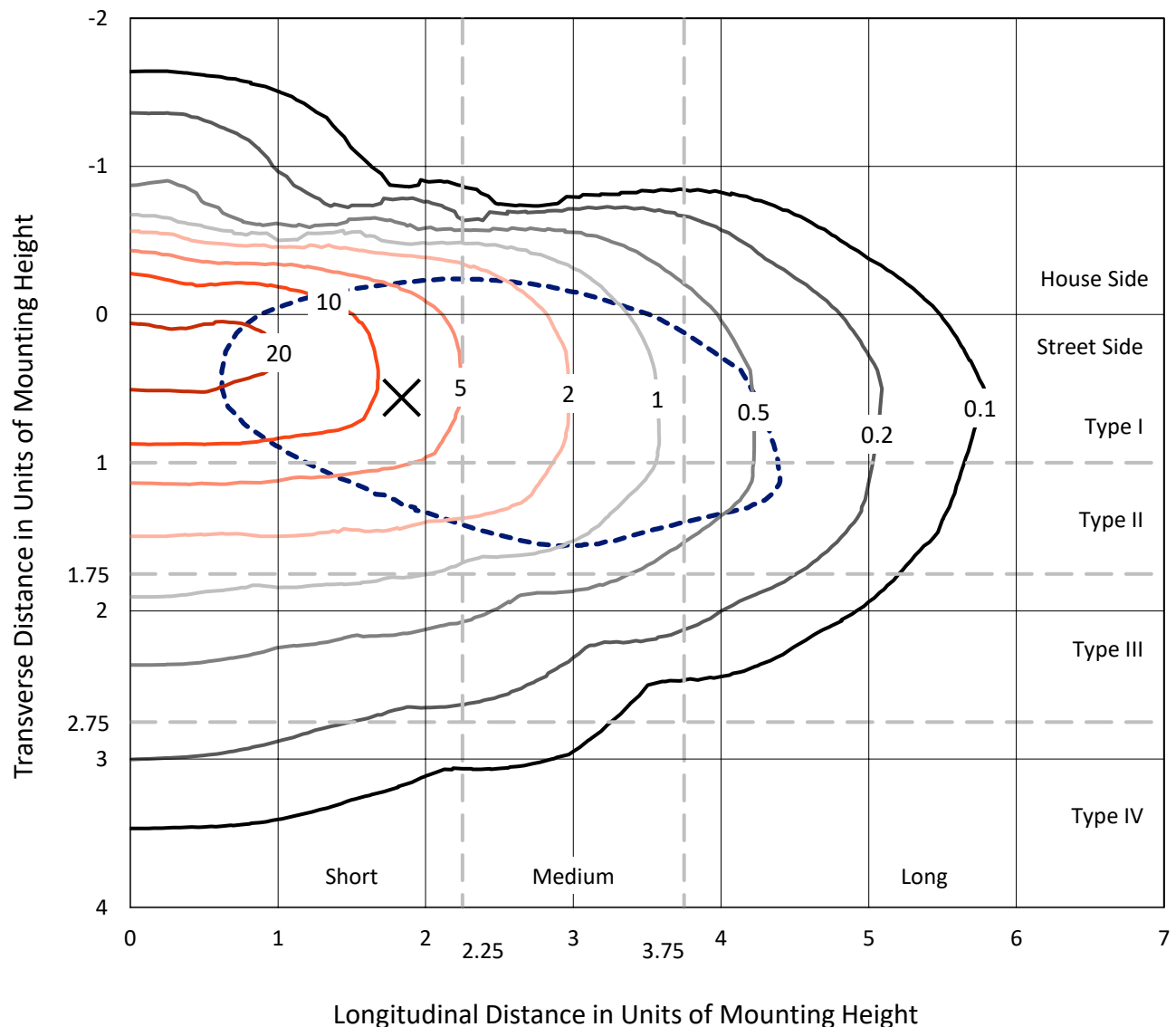
Input Watts (W): 761.9  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

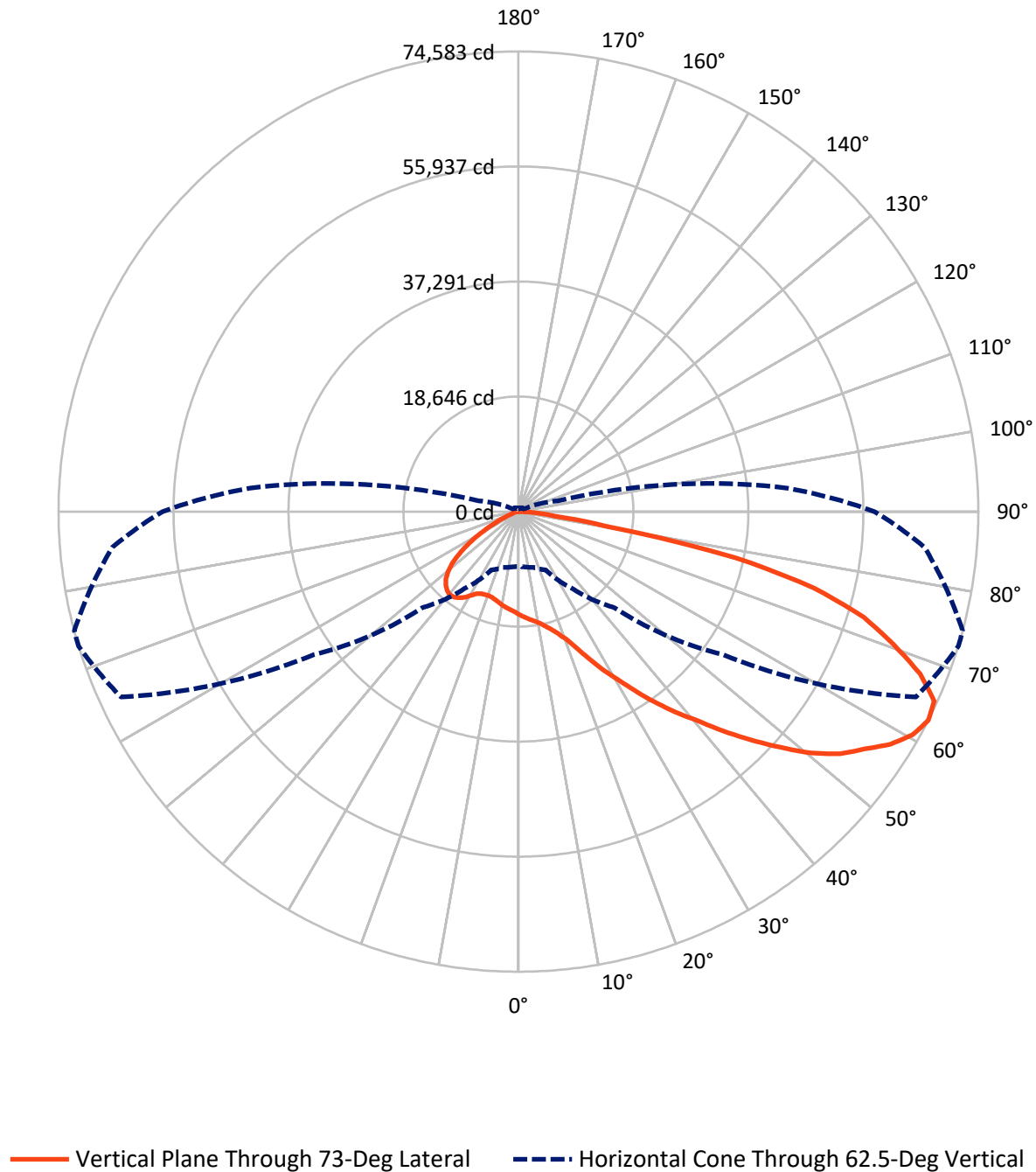
✕ Max cd  
 - - - 1/2 Max cd



Based on 30 foot mounting height. Maximum calculated value = 23.2 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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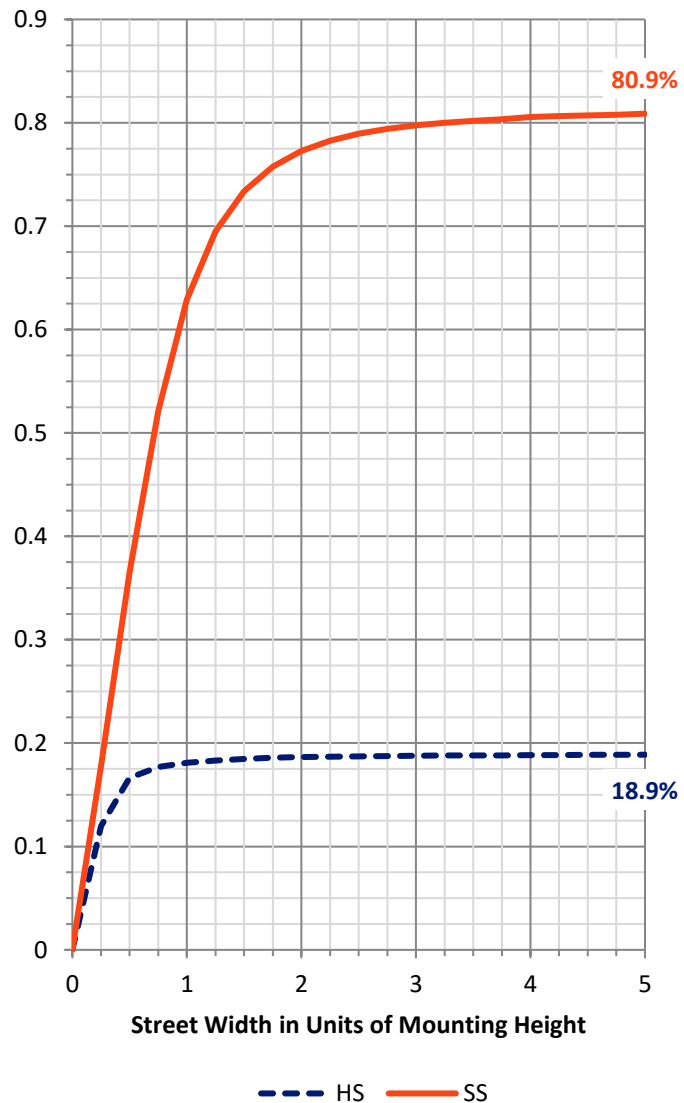
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 18211.7  | 0.0    | 18211.7 |
|                    | % Fixture | 19.1     | 0.0    | 19.1    |
| <b>Street Side</b> | Lumens    | 76990.3  | 0.0    | 76990.3 |
|                    | % Fixture | 80.9     | 0.0    | 80.9    |
| <b>Total</b>       | Lumens    | 95202.0  | 0.0    | 95202.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1594.7  | 1.7       |
| 10°-20°   | 4796.5  | 5.0       |
| 20°-30°   | 8287.4  | 8.7       |
| 30°-40°   | 12462.2 | 13.1      |
| 40°-50°   | 16617.1 | 17.5      |
| 50°-60°   | 19570.0 | 20.6      |
| 60°-70°   | 19456.0 | 20.4      |
| 70°-80°   | 11170.2 | 11.7      |
| 80°-90°   | 1247.8  | 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°    | 95202.0 | 100.0     |
| 0°-180°   | 95202.0 | 100.0     |

**Coefficient of Utilization**



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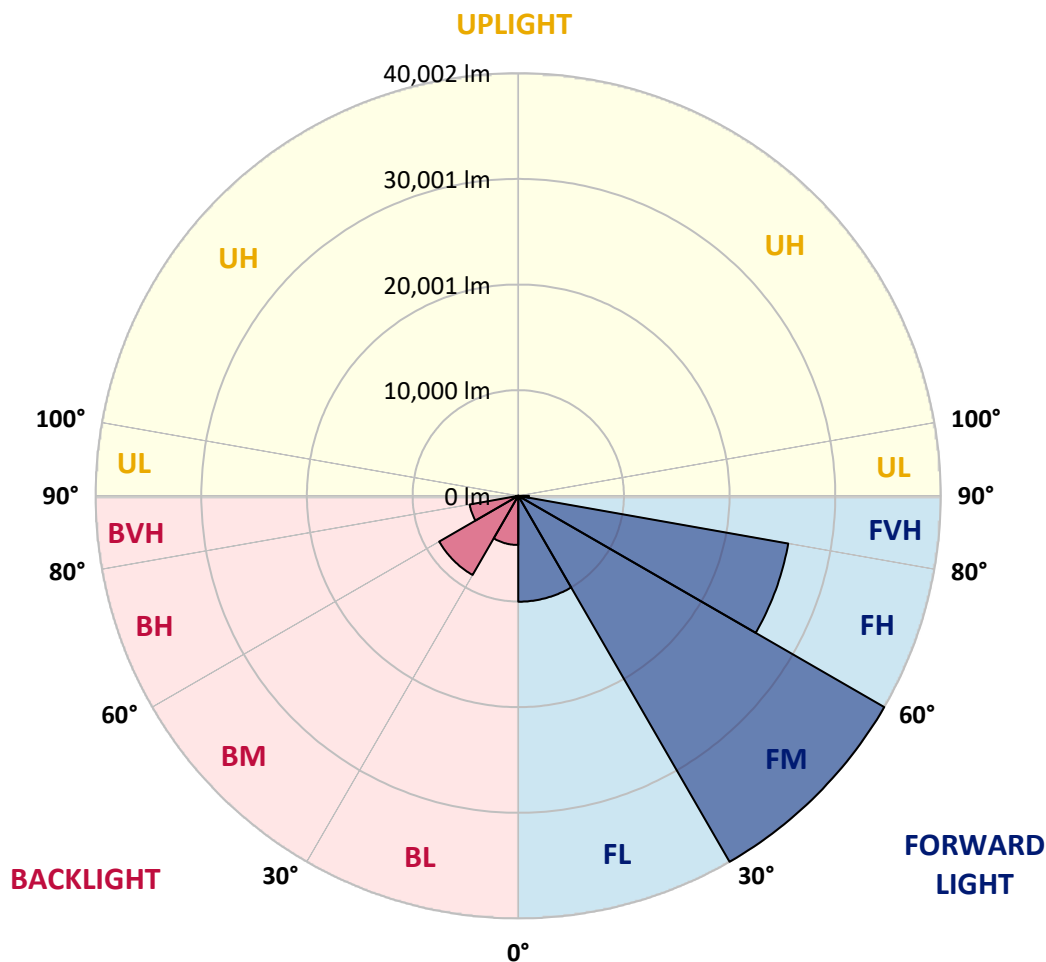
CATALOG NUMBER: CTN-CA10-760-730-U-T2-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 10024.7 | 10.5      |                         |      |         |
| FM   | (30°-60°)   | 40001.6 | 42.0      |                         |      |         |
| FH   | (60°-80°)   | 25950.6 | 27.3      |                         |      | G5      |
| FVH  | (80°-90°)   | 1013.5  | 1.1       |                         |      | G5      |
| BL   | (0°-30°)    | 4653.9  | 4.9       | B4/5000                 |      |         |
| BM   | (30°-60°)   | 8647.8  | 9.1       | B5                      |      |         |
| BH   | (60°-80°)   | 4675.6  | 4.9       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 234.4   | 0.2       |                         |      | G3/500  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B5-U0-G5**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 73°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 |
| 2.5°  | 17863.1 | 17907.9 | 17854.5 | 17831.0 | 17805.4 | 17638.7 | 17444.2 | 17245.5 | 17085.2 | 17059.6 | 16850.1 |
| 5°    | 19117.5 | 19141.0 | 19053.4 | 18952.9 | 18779.8 | 18504.2 | 18155.8 | 17811.8 | 17491.2 | 17405.7 | 17023.2 |
| 7.5°  | 20081.2 | 20036.4 | 20015.0 | 19929.5 | 19777.8 | 19474.3 | 18946.5 | 18382.3 | 17886.6 | 17766.9 | 17185.6 |
| 10°   | 20985.2 | 20966.0 | 20803.5 | 20696.7 | 20455.2 | 20175.3 | 19741.5 | 19025.6 | 18326.8 | 18134.5 | 17326.7 |
| 12.5° | 21963.9 | 21921.2 | 21854.9 | 21624.2 | 21427.5 | 20955.3 | 20431.7 | 19779.9 | 19002.1 | 18745.6 | 17568.2 |
| 15°   | 22844.4 | 22729.0 | 22692.6 | 22451.2 | 22252.4 | 21891.3 | 21365.6 | 20609.1 | 19777.8 | 19557.7 | 18027.6 |
| 17.5° | 23682.1 | 23628.6 | 23547.4 | 23382.9 | 23160.6 | 22882.8 | 22461.8 | 21651.9 | 20792.9 | 20472.3 | 18807.6 |
| 20°   | 24393.7 | 24327.4 | 24256.9 | 24301.8 | 24252.6 | 24075.3 | 23810.3 | 23120.0 | 22070.8 | 21760.9 | 19756.4 |
| 22.5° | 24889.5 | 24887.3 | 25169.4 | 25334.0 | 25428.0 | 25421.6 | 25357.5 | 24966.4 | 23910.7 | 23596.6 | 21175.4 |
| 25°   | 25301.9 | 25334.0 | 25690.8 | 26317.0 | 26876.9 | 26928.1 | 27381.2 | 27195.3 | 26297.7 | 25970.8 | 23310.2 |
| 27.5° | 25423.7 | 25487.8 | 26135.3 | 27120.5 | 27971.0 | 28787.3 | 29451.9 | 29791.7 | 28960.4 | 28569.4 | 25605.4 |
| 30°   | 25511.3 | 25537.0 | 26171.7 | 27351.3 | 29144.2 | 30437.1 | 31625.2 | 32200.1 | 31484.2 | 31197.8 | 28163.3 |
| 32.5° | 24893.7 | 24902.3 | 25874.6 | 27661.1 | 30005.4 | 32247.1 | 33653.2 | 34736.7 | 34548.6 | 34170.4 | 30960.6 |
| 35°   | 24043.2 | 24201.4 | 25316.9 | 27362.0 | 30714.9 | 33909.7 | 35824.4 | 37440.0 | 37816.1 | 37544.7 | 33755.8 |
| 37.5° | 22991.8 | 23115.8 | 24310.3 | 26917.5 | 30870.9 | 35053.0 | 37512.6 | 40188.1 | 41171.2 | 41126.3 | 37130.1 |
| 40°   | 21698.9 | 21850.7 | 23280.3 | 25960.1 | 30794.0 | 35884.3 | 39493.6 | 43231.2 | 44479.2 | 44338.2 | 40476.6 |
| 42.5° | 20171.0 | 20393.2 | 21780.2 | 24729.2 | 30231.9 | 36392.9 | 41115.6 | 46329.8 | 48575.8 | 48483.9 | 43438.5 |
| 45°   | 18660.2 | 18779.8 | 20044.9 | 23015.3 | 29197.6 | 36557.4 | 42641.4 | 50599.5 | 52777.1 | 52674.5 | 47007.3 |
| 47.5° | 17102.3 | 17207.0 | 18527.7 | 21209.6 | 27402.6 | 36226.2 | 43848.8 | 54266.6 | 57057.5 | 56954.9 | 50552.5 |
| 50°   | 13478.0 | 13873.3 | 16580.9 | 19621.8 | 25357.5 | 35288.0 | 44987.8 | 58835.5 | 61536.6 | 61100.7 | 53657.6 |
| 52.5° | 11531.2 | 11674.3 | 13078.3 | 18021.2 | 23316.6 | 33687.4 | 45748.6 | 63068.8 | 65220.8 | 64592.5 | 56833.1 |
| 55°   | 10779.0 | 10875.1 | 11563.2 | 15070.0 | 21399.8 | 31266.2 | 46644.0 | 67312.9 | 67983.9 | 67823.6 | 59423.1 |
| 57.5° | 10208.4 | 10315.2 | 10806.7 | 12586.8 | 19380.3 | 27872.7 | 46364.0 | 70298.3 | 71138.1 | 70625.2 | 62173.4 |
| 60°   | 9400.6  | 9531.0  | 10182.7 | 11300.4 | 17085.2 | 24427.9 | 43900.1 | 71520.6 | 73431.1 | 72854.1 | 64265.5 |
| 62.5° | 8892.0  | 8977.5  | 9351.4  | 10434.9 | 15183.3 | 22004.5 | 40393.3 | 71127.4 | 74582.9 | 74561.5 | 66079.8 |
| 65°   | 8201.7  | 8327.8  | 8727.4  | 9605.7  | 13490.8 | 20126.1 | 37085.2 | 69184.9 | 74087.1 | 74106.4 | 66453.8 |
| 67.5° | 7479.4  | 7530.7  | 7949.6  | 8654.8  | 11497.0 | 18405.9 | 32804.9 | 65861.9 | 70225.6 | 70665.8 | 63865.9 |
| 70°   | 6577.6  | 6552.0  | 7005.0  | 7520.0  | 9396.3  | 15627.8 | 26404.6 | 59951.0 | 64519.8 | 64701.5 | 58632.5 |
| 72.5° | 5175.8  | 5199.3  | 5325.4  | 5682.2  | 7133.3  | 12298.3 | 19160.2 | 50650.8 | 58555.5 | 58878.2 | 51943.7 |
| 75°   | 3479.0  | 3517.5  | 4105.1  | 4453.5  | 5130.9  | 8838.6  | 12048.3 | 34189.6 | 49501.1 | 50411.5 | 42513.2 |
| 77.5° | 2654.1  | 2677.6  | 2848.6  | 3229.0  | 3711.9  | 6299.8  | 6530.6  | 18630.2 | 36038.1 | 38198.6 | 33257.9 |
| 80°   | 1880.5  | 1889.1  | 1720.3  | 1530.1  | 1976.7  | 4274.0  | 3857.3  | 7934.6  | 14360.5 | 16969.8 | 19534.2 |
| 82.5° | 842.0   | 829.2   | 976.6   | 812.1   | 1139.0  | 1654.0  | 1820.7  | 3850.8  | 5964.3  | 6411.0  | 6979.4  |
| 85°   | 391.1   | 438.1   | 502.2   | 421.0   | 677.4   | 639.0   | 709.5   | 1641.2  | 2795.2  | 3085.8  | 3068.7  |
| 87.5° | 96.2    | 104.7   | 132.5   | 168.8   | 245.8   | 218.0   | 213.7   | 483.0   | 624.0   | 621.9   | 955.2   |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



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CATALOG NUMBER: CTN-CA10-760-730-U-T2-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°    | 125°    | 135°    | 145°    | 155°    | 165°    | 175°    | 180°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 | 16696.3 |
| 2.5°  | 16706.9 | 16595.8 | 16333.0 | 16078.7 | 15837.2 | 15676.9 | 15497.4 | 15309.4 | 15196.1 | 15142.7 | 15258.1 |
| 5°    | 16790.3 | 16578.7 | 16076.5 | 15572.2 | 15144.8 | 14779.4 | 14522.9 | 14305.0 | 14187.4 | 14198.1 | 14204.5 |
| 7.5°  | 16860.8 | 16563.8 | 15860.7 | 15149.1 | 14482.3 | 14029.3 | 13693.8 | 13458.7 | 13324.1 | 13221.5 | 13298.5 |
| 10°   | 16922.8 | 16501.8 | 15608.5 | 14659.7 | 13935.3 | 13264.3 | 12809.1 | 12524.9 | 12277.0 | 12138.1 | 12247.1 |
| 12.5° | 16989.0 | 16478.3 | 15326.5 | 14221.6 | 13283.5 | 12533.4 | 11909.4 | 11627.3 | 11383.7 | 11279.0 | 11345.3 |
| 15°   | 17277.5 | 16568.0 | 15063.6 | 13706.6 | 12640.3 | 11670.1 | 10996.9 | 10650.7 | 10458.4 | 10332.3 | 10360.1 |
| 17.5° | 17773.3 | 16805.2 | 14894.8 | 13168.1 | 11922.2 | 10896.5 | 10024.6 | 9620.7  | 9302.3  | 9212.5  | 9189.0  |
| 20°   | 18478.5 | 17256.2 | 14894.8 | 12712.9 | 11108.0 | 10037.4 | 9033.0  | 8351.3  | 7855.6  | 7669.6  | 7812.8  |
| 22.5° | 19662.4 | 18023.3 | 15042.2 | 12300.5 | 10407.1 | 9146.3  | 7949.6  | 6908.9  | 6240.0  | 5968.6  | 6126.7  |
| 25°   | 21318.6 | 19209.4 | 15281.6 | 11939.3 | 9768.2  | 8120.5  | 6575.5  | 5378.8  | 4641.5  | 4318.8  | 4314.6  |
| 27.5° | 23481.2 | 21023.7 | 15764.5 | 11644.4 | 9003.1  | 6793.5  | 5141.6  | 3989.8  | 3297.4  | 3102.9  | 3130.7  |
| 30°   | 25878.9 | 22989.7 | 16677.0 | 11217.0 | 8073.5  | 5308.3  | 3744.0  | 2931.9  | 2444.7  | 2188.3  | 2192.5  |
| 32.5° | 28191.1 | 25026.2 | 17760.5 | 10939.2 | 6866.1  | 4002.6  | 2669.1  | 2092.1  | 1788.7  | 1636.9  | 1660.4  |
| 35°   | 30670.0 | 26782.8 | 18566.1 | 10473.4 | 5449.3  | 2893.5  | 1887.0  | 1568.5  | 1442.5  | 1363.4  | 1367.7  |
| 37.5° | 33347.6 | 28714.7 | 19228.6 | 9849.4  | 4120.1  | 1987.4  | 1393.3  | 1344.2  | 1290.7  | 1190.3  | 1181.8  |
| 40°   | 36145.0 | 30952.1 | 19623.9 | 8840.7  | 2863.6  | 1376.2  | 1183.9  | 1239.5  | 1209.5  | 1079.2  | 1068.5  |
| 42.5° | 38517.0 | 32678.8 | 19722.2 | 7505.1  | 1852.8  | 1115.5  | 1072.8  | 1158.2  | 1164.7  | 1032.2  | 1015.1  |
| 45°   | 40795.0 | 34217.4 | 19529.9 | 5746.4  | 1284.3  | 1049.3  | 1004.4  | 1121.9  | 1130.5  | 1010.8  | 983.0   |
| 47.5° | 43344.5 | 36322.3 | 19181.6 | 3833.8  | 1062.1  | 991.6   | 980.9   | 1062.1  | 1092.0  | 993.7   | 959.5   |
| 50°   | 46441.0 | 38034.1 | 18149.4 | 2355.0  | 1002.2  | 955.2   | 955.2   | 1004.4  | 1045.0  | 959.5   | 942.4   |
| 52.5° | 49616.5 | 39525.7 | 16621.5 | 1615.6  | 965.9   | 916.8   | 944.5   | 965.9   | 980.9   | 903.9   | 918.9   |
| 55°   | 51892.4 | 40848.5 | 14343.4 | 1299.3  | 944.5   | 891.1   | 957.4   | 914.6   | 893.3   | 827.0   | 812.1   |
| 57.5° | 54418.3 | 42421.3 | 12014.1 | 1151.8  | 916.8   | 906.1   | 914.6   | 833.4   | 773.6   | 705.2   | 690.2   |
| 60°   | 56181.3 | 43267.5 | 9163.4  | 1083.5  | 884.7   | 891.1   | 844.1   | 735.1   | 626.1   | 577.0   | 566.3   |
| 62.5° | 57720.0 | 43750.5 | 6716.5  | 995.8   | 854.8   | 852.7   | 765.0   | 628.3   | 515.0   | 461.6   | 453.0   |
| 65°   | 57487.0 | 42996.1 | 4353.0  | 925.3   | 831.3   | 803.5   | 686.0   | 538.5   | 429.5   | 388.9   | 384.7   |
| 67.5° | 54924.8 | 39658.2 | 2741.8  | 852.7   | 790.7   | 741.5   | 615.5   | 480.8   | 395.3   | 348.3   | 344.1   |
| 70°   | 49546.0 | 35048.7 | 1677.5  | 758.6   | 703.1   | 656.1   | 544.9   | 450.9   | 374.0   | 318.4   | 307.7   |
| 72.5° | 42111.4 | 30018.2 | 1186.0  | 668.9   | 613.3   | 557.8   | 461.6   | 429.5   | 356.9   | 286.4   | 277.8   |
| 75°   | 34597.8 | 22111.4 | 993.7   | 583.4   | 523.6   | 448.8   | 393.2   | 399.6   | 335.5   | 260.7   | 254.3   |
| 77.5° | 24363.8 | 13785.7 | 925.3   | 476.5   | 412.4   | 356.9   | 339.8   | 365.4   | 307.7   | 239.3   | 232.9   |
| 80°   | 14219.5 | 7742.3  | 765.0   | 376.1   | 309.9   | 275.7   | 284.2   | 309.9   | 269.3   | 215.8   | 207.3   |
| 82.5° | 5739.9  | 3064.4  | 538.5   | 292.8   | 226.5   | 220.1   | 232.9   | 252.2   | 222.2   | 181.6   | 177.4   |
| 85°   | 2049.4  | 957.4   | 305.6   | 192.3   | 145.3   | 151.7   | 149.6   | 179.5   | 160.3   | 132.5   | 130.4   |
| 87.5° | 538.5   | 190.2   | 136.8   | 76.9    | 62.0    | 62.0    | 57.7    | 83.3    | 76.9    | 59.8    | 66.2    |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-6

Luminaire Tested: CST-CA6-230-730-U-T4

Test Date: 04/22/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-6  
 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-CA6-230-730-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2914    | CRI (Ra): | 73.2 |      |       |
| CIE u':                   | 0.2541  | R1:       | 70.1 | R9:  | -27.2 |
| CIE v':                   | 0.5212  | R2:       | 83.3 | R10: | 61.9  |
| Duv:                      | -0.0013 | R3:       | 94.2 | R11: | 65.4  |
| CIE x:                    | 0.4410  | R4:       | 69.4 | R12: | 53.3  |
| CIE y:                    | 0.4020  | R5:       | 69.3 | R13: | 72.6  |
| CIE z:                    | 0.1571  | R6:       | 77.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 599     | R7:       | 77.5 |      |       |
| Dominant Wavelength (nm): | 583     | R8:       | 44.9 |      |       |
| Purity:                   | 53.4    |           |      |      |       |
| Rf:                       | 75.3    |           |      |      |       |
| Rg:                       | 95.7    |           |      |      |       |



### Test Conditions

Stabilization Time: 72M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.6/15%  
 Sphere Temperature (°C): 24.0

REPORT NUMBER: SP1-2104-215-6

| 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            |



REPORT NUMBER: SP1-2104-215-6

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 3000K 7-step quadrangle

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### Photopic Flux vs. Wavelength



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| 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       | 12827            | 0.0              | 490       | 80096            | 11.4             | 620       | 649050           | 168.9            | 750       | 30187            | 0.0              | 880       | 19756            | 0.0              |
| 365       | 11336            | 0.0              | 495       | 104447           | 18.9             | 625       | 608162           | 134.2            | 755       | 27442            | 0.0              | 885       | 21245            | 0.0              |
| 370       | 11776            | 0.0              | 500       | 142477           | 31.4             | 630       | 557990           | 101.0            | 760       | 25382            | 0.0              | 890       | 17771            | 0.0              |
| 375       | 13009            | 0.0              | 505       | 187724           | 52.5             | 635       | 506861           | 76.2             | 765       | 23778            | 0.0              | 895       | 14356            | 0.0              |
| 380       | 13906            | 0.0              | 510       | 232209           | 79.8             | 640       | 460827           | 55.1             | 770       | 21474            | 0.0              | 900       | 16683            | 0.0              |
| 385       | 12960            | 0.0              | 515       | 273388           | 113.2            | 645       | 418064           | 40.3             | 775       | 21394            | 0.0              | 905       | 16548            | 0.0              |
| 390       | 11750            | 0.0              | 520       | 308378           | 149.5            | 650       | 376246           | 27.5             | 780       | 18945            | 0.0              | 910       | 15630            | 0.0              |
| 395       | 10399            | 0.0              | 525       | 336804           | 180.8            | 655       | 332016           | 19.0             | 785       | 16318            | 0.0              | 915       | 20907            | 0.0              |
| 400       | 9192             | 0.0              | 530       | 361609           | 212.9            | 660       | 294638           | 12.3             | 790       | 17841            | 0.0              | 920       | 16083            | 0.0              |
| 405       | 8943             | 0.0              | 535       | 382440           | 237.2            | 665       | 259105           | 8.2              | 795       | 16506            | 0.0              | 925       | 20203            | 0.0              |
| 410       | 11120            | 0.0              | 540       | 401976           | 261.9            | 670       | 223041           | 4.9              | 800       | 15058            | 0.0              | 930       | 22625            | 0.0              |
| 415       | 18193            | 0.0              | 545       | 426232           | 283.7            | 675       | 193569           | 3.2              | 805       | 16851            | 0.0              | 935       | 24828            | 0.0              |
| 420       | 32317            | 0.1              | 550       | 455969           | 309.9            | 680       | 167520           | 1.9              | 810       | 16679            | 0.0              | 940       | 21275            | 0.0              |
| 425       | 59220            | 0.3              | 555       | 490448           | 335.0            | 685       | 144697           | 1.2              | 815       | 15851            | 0.0              | 945       | 23270            | 0.0              |
| 430       | 100522           | 0.8              | 560       | 530799           | 360.7            | 690       | 125032           | 0.7              | 820       | 15536            | 0.0              | 950       | 21756            | 0.0              |
| 435       | 155311           | 1.8              | 565       | 572799           | 380.9            | 695       | 107458           | 0.5              | 825       | 16381            | 0.0              | 955       | 24823            | 0.0              |
| 440       | 239817           | 3.8              | 570       | 615361           | 400.1            | 700       | 93549            | 0.3              | 830       | 16149            | 0.0              | 960       | 19499            | 0.0              |
| 445       | 368265           | 7.7              | 575       | 659689           | 410.5            | 705       | 81608            | 0.2              | 835       | 16687            | 0.0              | 965       | 27077            | 0.0              |
| 450       | 439895           | 11.4             | 580       | 700037           | 416.0            | 710       | 71559            | 0.1              | 840       | 16206            | 0.0              | 970       | 28727            | 0.0              |
| 455       | 329010           | 11.0             | 585       | 734518           | 408.1            | 715       | 65193            | 0.1              | 845       | 16062            | 0.0              | 975       | 21725            | 0.0              |
| 460       | 207545           | 8.5              | 590       | 760906           | 393.4            | 720       | 58466            | 0.0              | 850       | 18530            | 0.0              | 980       | 33536            | 0.0              |
| 465       | 154577           | 8.0              | 595       | 763605           | 362.0            | 725       | 52265            | 0.0              | 855       | 17709            | 0.0              | 985       | 30537            | 0.0              |
| 470       | 110708           | 6.9              | 600       | 766048           | 330.1            | 730       | 46287            | 0.0              | 860       | 18086            | 0.0              | 990       | 25187            | 0.0              |
| 475       | 78445            | 6.2              | 605       | 756483           | 293.0            | 735       | 40164            | 0.0              | 865       | 19763            | 0.0              | 995       | 35676            | 0.0              |
| 480       | 68887            | 6.5              | 610       | 730981           | 251.1            | 740       | 35097            | 0.0              | 870       | 19416            | 0.0              | 1000      | 32909            | 0.0              |
| 485       | 69832            | 8.3              | 615       | 694682           | 209.7            | 745       | 32334            | 0.0              | 875       | 19352            | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 43125.2

S/P: 1.19

| $\lambda$<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               | 12827                         | 0.0                            | 490               | 80096                         | 123.3                          | 620               | 649050                        | 8.1                            | 750               | 30187                         | 0.0                            | 880               | 19756                         | 0.0                            |
| 365               | 11336                         | 0.0                            | 495               | 104447                        | 168.8                          | 625               | 608162                        | 5.1                            | 755               | 27442                         | 0.0                            | 885               | 21245                         | 0.0                            |
| 370               | 11776                         | 0.0                            | 500               | 142477                        | 238.3                          | 630               | 557990                        | 3.2                            | 760               | 25382                         | 0.0                            | 890               | 17771                         | 0.0                            |
| 375               | 13009                         | 0.0                            | 505               | 187724                        | 319.1                          | 635               | 506861                        | 1.9                            | 765               | 23778                         | 0.0                            | 895               | 14356                         | 0.0                            |
| 380               | 13906                         | 0.0                            | 510               | 232209                        | 393.6                          | 640               | 460827                        | 1.2                            | 770               | 21474                         | 0.0                            | 900               | 16683                         | 0.0                            |
| 385               | 12960                         | 0.0                            | 515               | 273388                        | 453.1                          | 645               | 418064                        | 0.7                            | 775               | 21394                         | 0.0                            | 905               | 16548                         | 0.0                            |
| 390               | 11750                         | 0.0                            | 520               | 308378                        | 490.2                          | 650               | 376246                        | 0.4                            | 780               | 18945                         | 0.0                            | 910               | 15630                         | 0.0                            |
| 395               | 10399                         | 0.1                            | 525               | 336804                        | 503.9                          | 655               | 332016                        | 0.3                            | 785               | 16318                         | 0.0                            | 915               | 20907                         | 0.0                            |
| 400               | 9192                          | 0.1                            | 530               | 361609                        | 498.6                          | 660               | 294638                        | 0.2                            | 790               | 17841                         | 0.0                            | 920               | 16083                         | 0.0                            |
| 405               | 8943                          | 0.3                            | 535               | 382440                        | 476.6                          | 665               | 259105                        | 0.1                            | 795               | 16506                         | 0.0                            | 925               | 20203                         | 0.0                            |
| 410               | 11120                         | 0.7                            | 540               | 401976                        | 444.2                          | 670               | 223041                        | 0.1                            | 800               | 15058                         | 0.0                            | 930               | 22625                         | 0.0                            |
| 415               | 18193                         | 1.9                            | 545               | 426232                        | 408.7                          | 675               | 193569                        | 0.0                            | 805               | 16851                         | 0.0                            | 935               | 24828                         | 0.0                            |
| 420               | 32317                         | 5.3                            | 550               | 455969                        | 372.8                          | 680               | 167520                        | 0.0                            | 810               | 16679                         | 0.0                            | 940               | 21275                         | 0.0                            |
| 425               | 59220                         | 14.5                           | 555               | 490448                        | 335.2                          | 685               | 144697                        | 0.0                            | 815               | 15851                         | 0.0                            | 945               | 23270                         | 0.0                            |
| 430               | 100522                        | 34.2                           | 560               | 530799                        | 296.7                          | 690               | 125032                        | 0.0                            | 820               | 15536                         | 0.0                            | 950               | 21756                         | 0.0                            |
| 435               | 155311                        | 69.4                           | 565               | 572799                        | 257.0                          | 695               | 107458                        | 0.0                            | 825               | 16381                         | 0.0                            | 955               | 24823                         | 0.0                            |
| 440               | 239817                        | 134.0                          | 570               | 615361                        | 217.2                          | 700               | 93549                         | 0.0                            | 830               | 16149                         | 0.0                            | 960               | 19499                         | 0.0                            |
| 445               | 368265                        | 246.6                          | 575               | 659689                        | 179.7                          | 705               | 81608                         | 0.0                            | 835               | 16687                         | 0.0                            | 965               | 27077                         | 0.0                            |
| 450               | 439895                        | 340.9                          | 580               | 700037                        | 144.2                          | 710               | 71559                         | 0.0                            | 840               | 16206                         | 0.0                            | 970               | 28727                         | 0.0                            |
| 455               | 329010                        | 287.5                          | 585               | 734518                        | 112.3                          | 715               | 65193                         | 0.0                            | 845               | 16062                         | 0.0                            | 975               | 21725                         | 0.0                            |
| 460               | 207545                        | 200.5                          | 590               | 760906                        | 84.7                           | 720               | 58466                         | 0.0                            | 850               | 18530                         | 0.0                            | 980               | 33536                         | 0.0                            |
| 465               | 154577                        | 163.3                          | 595               | 763605                        | 60.9                           | 725               | 52265                         | 0.0                            | 855               | 17709                         | 0.0                            | 985               | 30537                         | 0.0                            |
| 470               | 110708                        | 127.5                          | 600               | 766048                        | 43.2                           | 730               | 46287                         | 0.0                            | 860               | 18086                         | 0.0                            | 990               | 25187                         | 0.0                            |
| 475               | 78445                         | 98.1                           | 605               | 756483                        | 29.7                           | 735               | 40164                         | 0.0                            | 865               | 19763                         | 0.0                            | 995               | 35676                         | 0.0                            |
| 480               | 68887                         | 93.1                           | 610               | 730981                        | 19.8                           | 740               | 35097                         | 0.0                            | 870               | 19416                         | 0.0                            | 1000              | 32909                         | 0.0                            |
| 485               | 69832                         | 101.2                          | 615               | 694682                        | 12.8                           | 745               | 32334                         | 0.0                            | 875               | 19352                         | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 15555.2      M/P: 0.43**

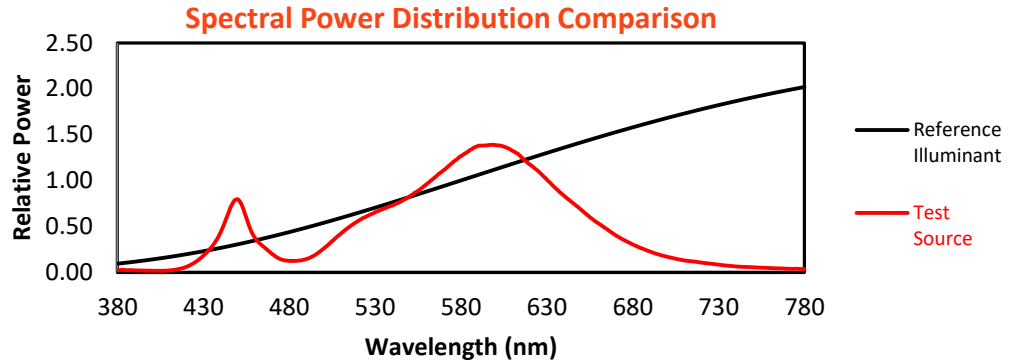
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 12827            | 0.0              | 490       | 80096            | 66.7             | 620       | 649050           | 0.5              | 750       | 30187            | 0.0              | 880       | 19756            | 0.0              |
| 365       | 11336            | 0.0              | 495       | 104447           | 86.2             | 625       | 608162           | 0.3              | 755       | 27442            | 0.0              | 885       | 21245            | 0.0              |
| 370       | 11776            | 0.0              | 500       | 142477           | 114.5            | 630       | 557990           | 0.2              | 760       | 25382            | 0.0              | 890       | 17771            | 0.0              |
| 375       | 13009            | 0.0              | 505       | 187724           | 144.1            | 635       | 506861           | 0.1              | 765       | 23778            | 0.0              | 895       | 14356            | 0.0              |
| 380       | 13906            | 0.0              | 510       | 232209           | 166.7            | 640       | 460827           | 0.1              | 770       | 21474            | 0.0              | 900       | 16683            | 0.0              |
| 385       | 12960            | 0.0              | 515       | 273388           | 178.6            | 645       | 418064           | 0.0              | 775       | 21394            | 0.0              | 905       | 16548            | 0.0              |
| 390       | 11750            | 0.0              | 520       | 308378           | 179.5            | 650       | 376246           | 0.0              | 780       | 18945            | 0.0              | 910       | 15630            | 0.0              |
| 395       | 10399            | 0.1              | 525       | 336804           | 170.8            | 655       | 332016           | 0.0              | 785       | 16318            | 0.0              | 915       | 20907            | 0.0              |
| 400       | 9192             | 0.1              | 530       | 361609           | 156.3            | 660       | 294638           | 0.0              | 790       | 17841            | 0.0              | 920       | 16083            | 0.0              |
| 405       | 8943             | 0.2              | 535       | 382440           | 137.6            | 665       | 259105           | 0.0              | 795       | 16506            | 0.0              | 925       | 20203            | 0.0              |
| 410       | 11120            | 0.4              | 540       | 401976           | 117.6            | 670       | 223041           | 0.0              | 800       | 15058            | 0.0              | 930       | 22625            | 0.0              |
| 415       | 18193            | 1.2              | 545       | 426232           | 99.0             | 675       | 193569           | 0.0              | 805       | 16851            | 0.0              | 935       | 24828            | 0.0              |
| 420       | 32317            | 3.7              | 550       | 455969           | 81.9             | 680       | 167520           | 0.0              | 810       | 16679            | 0.0              | 940       | 21275            | 0.0              |
| 425       | 59220            | 9.2              | 555       | 490448           | 66.1             | 685       | 144697           | 0.0              | 815       | 15851            | 0.0              | 945       | 23270            | 0.0              |
| 430       | 100522           | 21.2             | 560       | 530799           | 52.4             | 690       | 125032           | 0.0              | 820       | 15536            | 0.0              | 950       | 21756            | 0.0              |
| 435       | 155311           | 41.4             | 565       | 572799           | 40.2             | 695       | 107458           | 0.0              | 825       | 16381            | 0.0              | 955       | 24823            | 0.0              |
| 440       | 239817           | 80.1             | 570       | 615361           | 30.1             | 700       | 93549            | 0.0              | 830       | 16149            | 0.0              | 960       | 19499            | 0.0              |
| 445       | 368265           | 145.3            | 575       | 659689           | 22.0             | 705       | 81608            | 0.0              | 835       | 16687            | 0.0              | 965       | 27077            | 0.0              |
| 450       | 439895           | 202.7            | 580       | 700037           | 15.7             | 710       | 71559            | 0.0              | 840       | 16206            | 0.0              | 970       | 28727            | 0.0              |
| 455       | 329010           | 172.4            | 585       | 734518           | 10.9             | 715       | 65193            | 0.0              | 845       | 16062            | 0.0              | 975       | 21725            | 0.0              |
| 460       | 207545           | 122.3            | 590       | 760906           | 7.5              | 720       | 58466            | 0.0              | 850       | 18530            | 0.0              | 980       | 33536            | 0.0              |
| 465       | 154577           | 101.0            | 595       | 763605           | 4.9              | 725       | 52265            | 0.0              | 855       | 17709            | 0.0              | 985       | 30537            | 0.0              |
| 470       | 110708           | 79.3             | 600       | 766048           | 3.2              | 730       | 46287            | 0.0              | 860       | 18086            | 0.0              | 990       | 25187            | 0.0              |
| 475       | 78445            | 59.9             | 605       | 756483           | 2.1              | 735       | 40164            | 0.0              | 865       | 19763            | 0.0              | 995       | 35676            | 0.0              |
| 480       | 68887            | 55.4             | 610       | 730981           | 1.3              | 740       | 35097            | 0.0              | 870       | 19416            | 0.0              | 1000      | 32909            | 0.0              |
| 485       | 69832            | 57.6             | 615       | 694682           | 0.8              | 745       | 32334            | 0.0              | 875       | 19352            | 0.0              |           |                  |                  |

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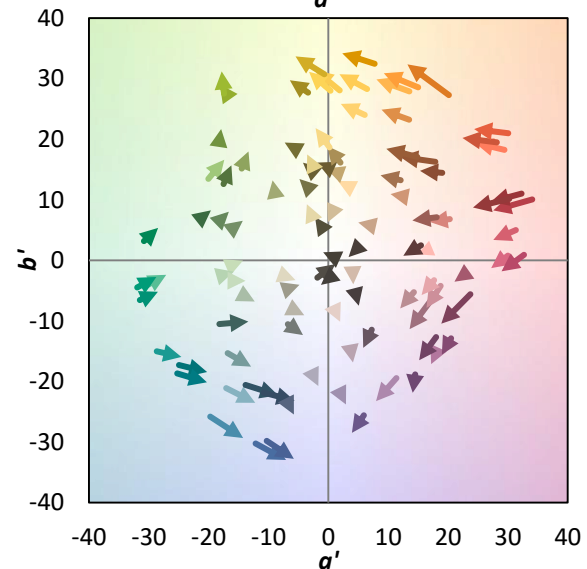
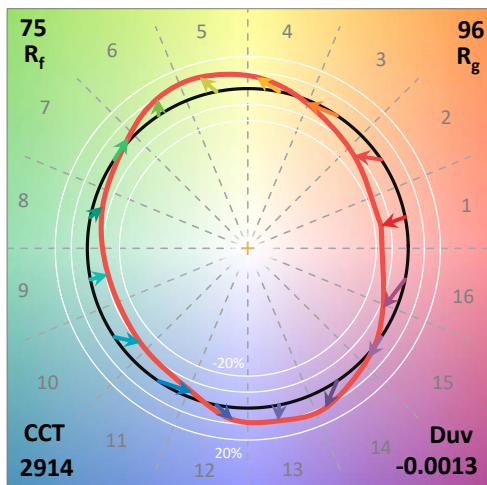
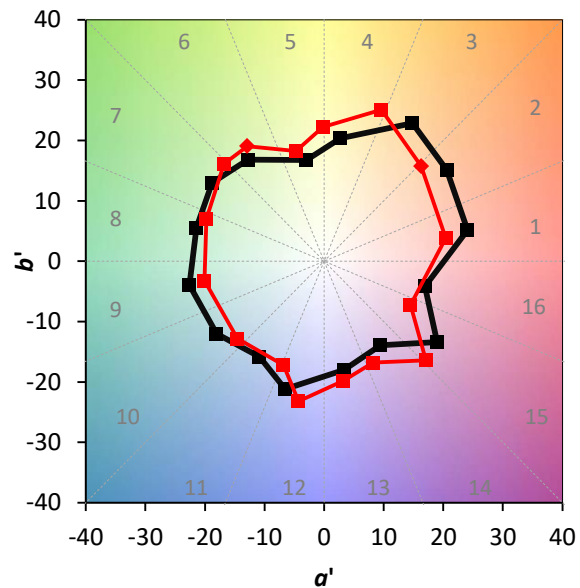
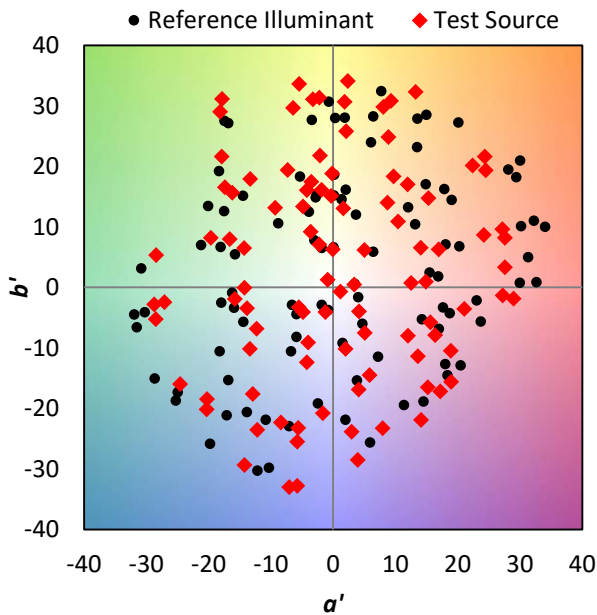
TM-30-18

### Summary

$R_f = 75.3$   
 $R_g = 95.7$   
 CIE  $R_a = 73.2$   
 $R_g = -27.2$



### Color Vector Graphics





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 65 | CES51 = 87 | CES76 = 59 |
| CES02 = 63 | CES27 = 88 | CES52 = 86 | CES77 = 78 |
| CES03 = 31 | CES28 = 85 | CES53 = 77 | CES78 = 63 |
| CES04 = 71 | CES29 = 64 | CES54 = 86 | CES79 = 86 |
| CES05 = 49 | CES30 = 77 | CES55 = 85 | CES80 = 84 |
| CES06 = 51 | CES31 = 68 | CES56 = 75 | CES81 = 72 |
| CES07 = 42 | CES32 = 62 | CES57 = 75 | CES82 = 93 |
| CES08 = 40 | CES33 = 74 | CES58 = 76 | CES83 = 89 |
| CES09 = 29 | CES34 = 75 | CES59 = 86 | CES84 = 89 |
| CES10 = 76 | CES35 = 87 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 98 | CES61 = 84 | CES86 = 64 |
| CES12 = 65 | CES37 = 84 | CES62 = 92 | CES87 = 78 |
| CES13 = 43 | CES38 = 85 | CES63 = 75 | CES88 = 80 |
| CES14 = 74 | CES39 = 95 | CES64 = 70 | CES89 = 67 |
| CES15 = 71 | CES40 = 90 | CES65 = 67 | CES90 = 79 |
| CES16 = 47 | CES41 = 89 | CES66 = 65 | CES91 = 84 |
| CES17 = 50 | CES42 = 84 | CES67 = 63 | CES92 = 60 |
| CES18 = 56 | CES43 = 75 | CES68 = 69 | CES93 = 75 |
| CES19 = 73 | CES44 = 99 | CES69 = 78 | CES94 = 52 |
| CES20 = 66 | CES45 = 83 | CES70 = 63 | CES95 = 70 |
| CES21 = 87 | CES46 = 80 | CES71 = 61 | CES96 = 78 |
| CES22 = 79 | CES47 = 81 | CES72 = 86 | CES97 = 83 |
| CES23 = 92 | CES48 = 72 | CES73 = 55 | CES98 = 77 |
| CES24 = 91 | CES49 = 77 | CES74 = 96 | CES99 = 66 |
| CES25 = 73 | CES50 = 86 | CES75 = 63 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)