

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: P510647

Luminaire Tested: **CTN-CA6-230-727-U-T2**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510647  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-10)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: CTN-CA6-230-727-U-T2  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (6) 2700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 28961 lumens  
Efficiency: N/A  
Efficacy: 127.1 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G3

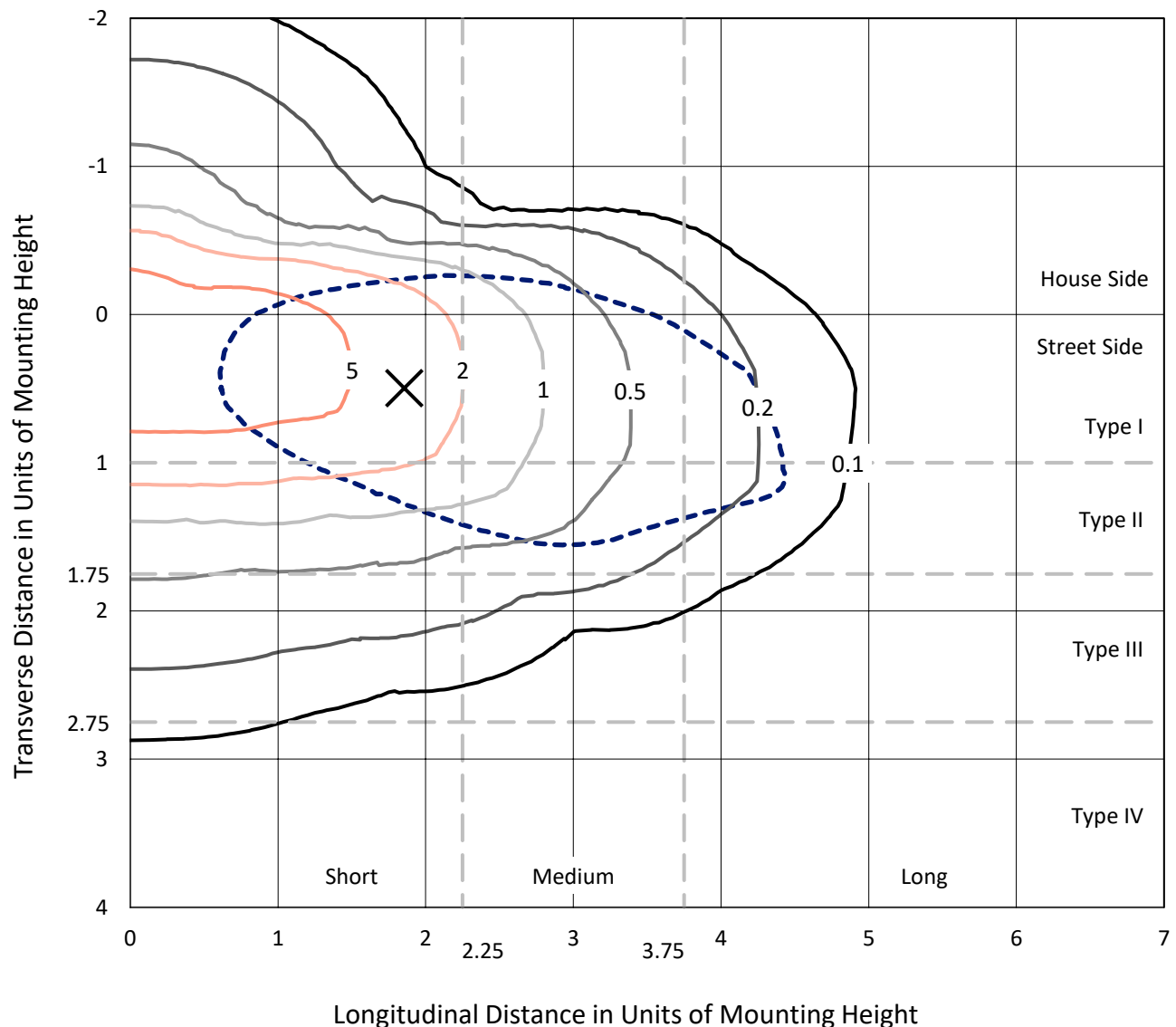
Input Watts (W): 227.8  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

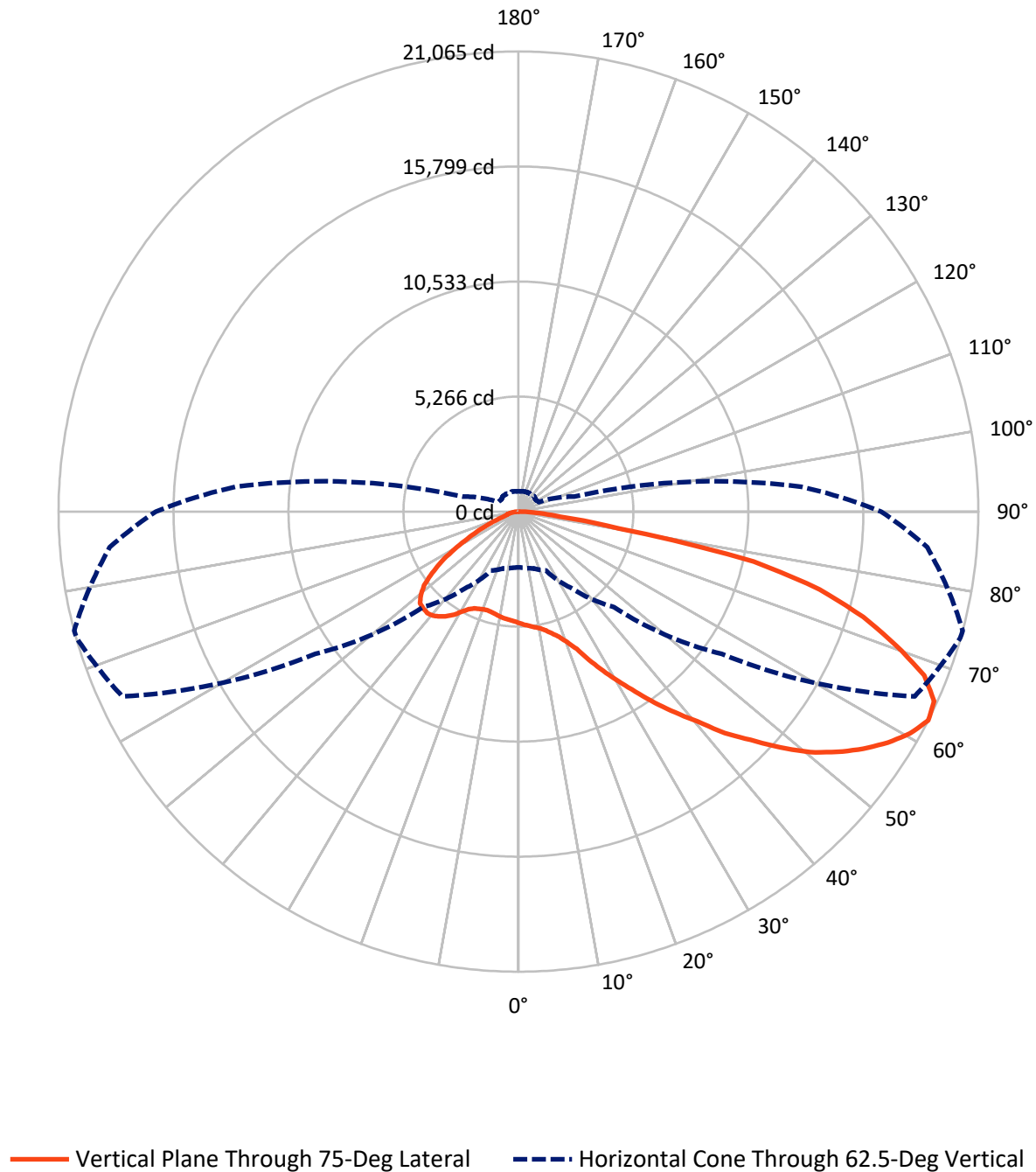
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 9.6 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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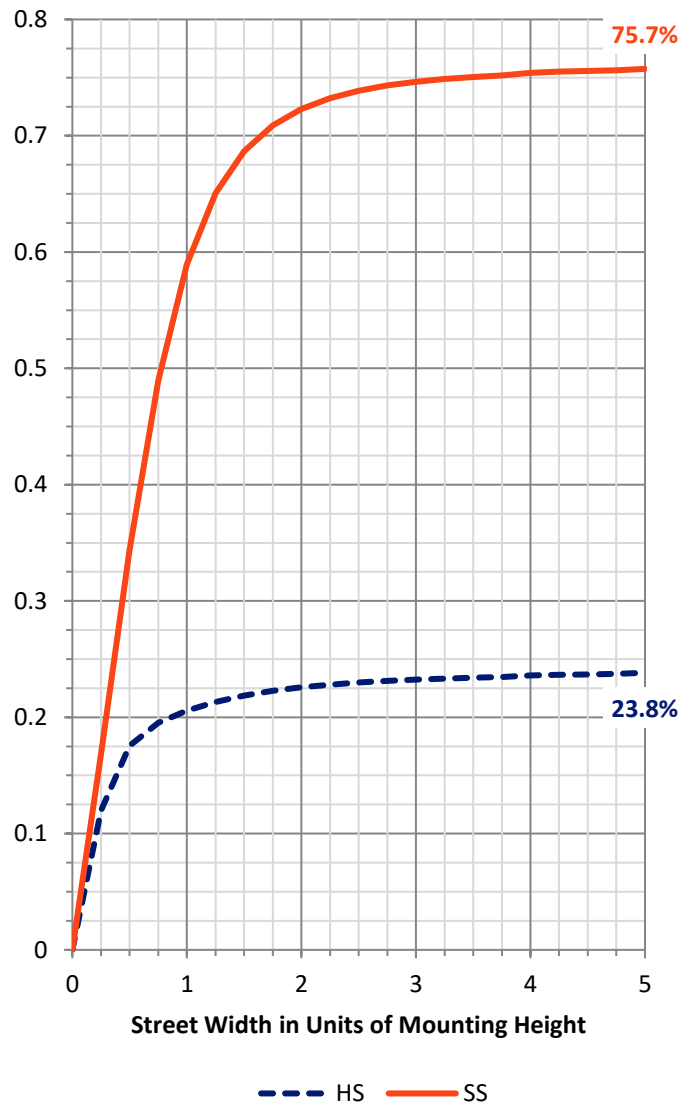
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 7016.7   | 0.0    | 7016.7  |
|                    | % Fixture | 24.2     | 0.0    | 24.2    |
| <b>Street Side</b> | Lumens    | 21944.3  | 0.0    | 21944.3 |
|                    | % Fixture | 75.8     | 0.0    | 75.8    |
| <b>Total</b>       | Lumens    | 28961.0  | 0.0    | 28961.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 491.1   | 1.7       |
| 10°-20°   | 1490.6  | 5.1       |
| 20°-30°   | 2570.8  | 8.9       |
| 30°-40°   | 3790.7  | 13.1      |
| 40°-50°   | 4997.0  | 17.3      |
| 50°-60°   | 5881.1  | 20.3      |
| 60°-70°   | 5851.1  | 20.2      |
| 70°-80°   | 3412.2  | 11.8      |
| 80°-90°   | 476.4   | 1.6       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 28961.0 | 100.0     |
| 0°-180°   | 28961.0 | 100.0     |

**Coefficient of Utilization**



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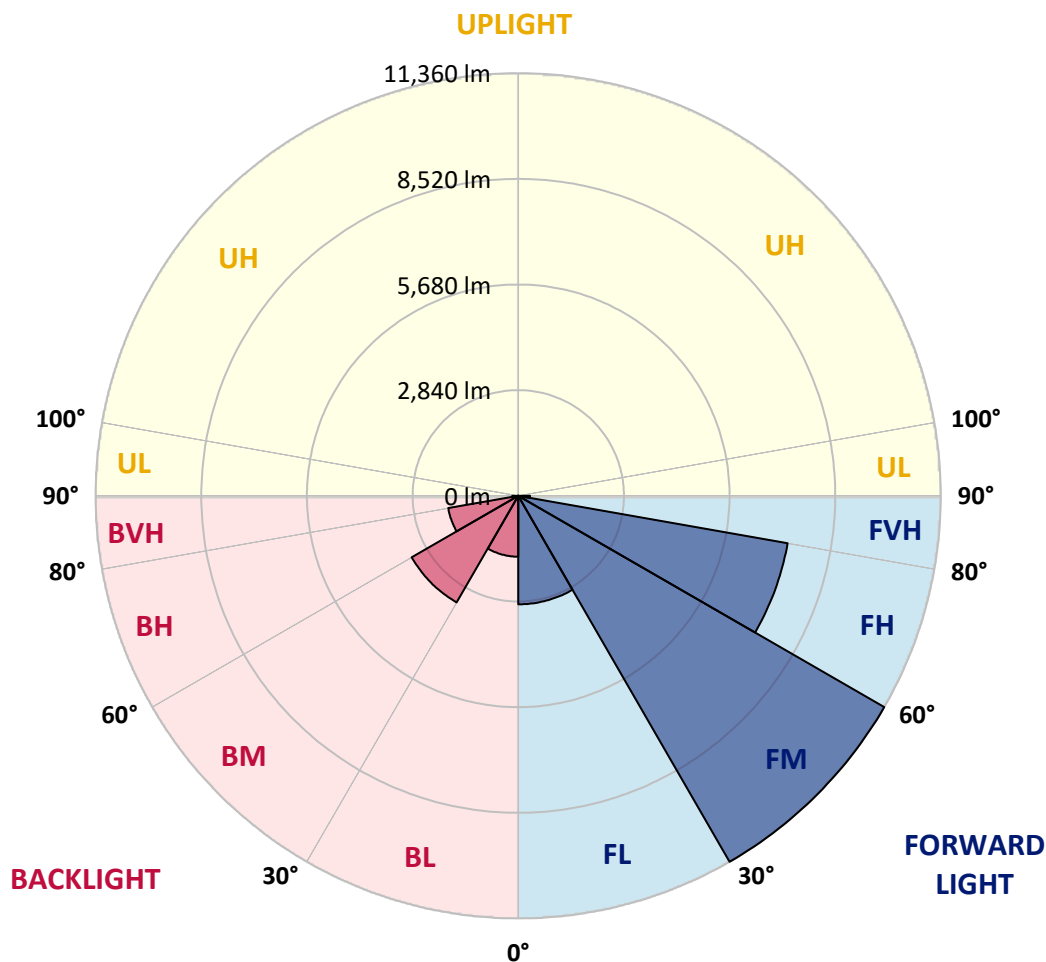
CATALOG NUMBER: CTN-CA6-230-727-U-T2

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 2916.3  | 10.1      |                         |      |         |
| FM   | (30°-60°)   | 11360.2 | 39.2      |                         |      |         |
| FH   | (60°-80°)   | 7351.6  | 25.4      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 316.2   | 1.1       |                         |      | G3/500  |
| BL   | (0°-30°)    | 1636.3  | 5.6       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 3308.6  | 11.4      | B3/5000                 |      |         |
| BH   | (60°-80°)   | 1911.6  | 6.6       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 160.3   | 0.6       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

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

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°     | 55°     | 65°     | 74°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| 0°    | 5105.2 | 5105.2 | 5105.2 | 5105.2 | 5105.2 | 5105.2  | 5105.2  | 5105.2  | 5105.2  | 5105.2  | 5105.2  |
| 2.5°  | 5384.7 | 5362.7 | 5365.6 | 5350.1 | 5326.9 | 5309.6  | 5264.3  | 5215.4  | 5186.2  | 5183.8  | 5142.1  |
| 5°    | 5655.3 | 5662.5 | 5664.3 | 5614.8 | 5565.9 | 5510.5  | 5441.3  | 5347.2  | 5270.3  | 5258.3  | 5177.3  |
| 7.5°  | 5902.1 | 5901.5 | 5897.9 | 5870.5 | 5847.8 | 5765.6  | 5627.3  | 5479.5  | 5354.3  | 5343.0  | 5211.3  |
| 10°   | 6154.8 | 6153.0 | 6117.3 | 6071.4 | 6020.1 | 5944.4  | 5825.8  | 5648.8  | 5446.1  | 5431.2  | 5242.9  |
| 12.5° | 6430.2 | 6410.5 | 6387.9 | 6332.4 | 6271.6 | 6140.5  | 6015.9  | 5823.4  | 5611.8  | 5585.0  | 5298.9  |
| 15°   | 6657.3 | 6637.0 | 6605.4 | 6567.9 | 6504.1 | 6404.0  | 6271.6  | 6043.3  | 5816.2  | 5790.0  | 5424.6  |
| 17.5° | 6882.0 | 6872.4 | 6849.8 | 6809.9 | 6761.0 | 6674.6  | 6553.0  | 6359.3  | 6061.8  | 6029.6  | 5633.9  |
| 20°   | 7066.2 | 7043.5 | 7026.8 | 7045.3 | 7049.5 | 6985.7  | 6918.9  | 6756.2  | 6428.4  | 6378.9  | 5890.8  |
| 22.5° | 7171.1 | 7166.3 | 7257.5 | 7325.4 | 7352.9 | 7367.2  | 7346.3  | 7215.2  | 6918.3  | 6831.9  | 6248.4  |
| 25°   | 7270.6 | 7262.9 | 7386.8 | 7556.7 | 7718.2 | 7800.5  | 7855.9  | 7873.2  | 7600.8  | 7522.7  | 6823.6  |
| 27.5° | 7273.6 | 7295.0 | 7475.1 | 7760.0 | 8006.1 | 8257.1  | 8522.9  | 8553.3  | 8314.3  | 8252.3  | 7478.0  |
| 30°   | 7289.7 | 7299.2 | 7477.4 | 7804.7 | 8317.3 | 8719.6  | 9065.9  | 9237.0  | 9030.7  | 9002.1  | 8198.7  |
| 32.5° | 7085.2 | 7097.8 | 7374.9 | 7882.8 | 8552.1 | 9198.2  | 9657.8  | 9911.7  | 9860.4  | 9824.1  | 8967.6  |
| 35°   | 6872.4 | 6883.2 | 7205.0 | 7771.9 | 8726.8 | 9632.8  | 10192.4 | 10691.3 | 10784.9 | 10757.5 | 9825.3  |
| 37.5° | 6538.7 | 6574.4 | 6911.8 | 7639.6 | 8757.2 | 9952.2  | 10702.7 | 11468.0 | 11750.5 | 11668.3 | 10732.5 |
| 40°   | 6176.3 | 6202.5 | 6595.3 | 7362.4 | 8723.2 | 10162.0 | 11203.9 | 12327.5 | 12669.6 | 12625.5 | 11633.1 |
| 42.5° | 5718.5 | 5788.8 | 6182.2 | 7008.3 | 8548.5 | 10292.6 | 11667.7 | 13302.0 | 13799.1 | 13858.1 | 12460.4 |
| 45°   | 5332.9 | 5331.1 | 5696.4 | 6495.7 | 8232.0 | 10323.6 | 12094.4 | 14287.3 | 15014.5 | 14903.6 | 13554.2 |
| 47.5° | 4879.3 | 4897.7 | 5279.2 | 5985.5 | 7765.3 | 10225.2 | 12427.0 | 15452.0 | 16188.1 | 16127.9 | 14451.2 |
| 50°   | 3829.6 | 3962.5 | 4684.9 | 5546.8 | 7134.1 | 9951.0  | 12704.2 | 16586.3 | 17289.0 | 17316.4 | 15266.6 |
| 52.5° | 3301.5 | 3352.8 | 3751.5 | 5105.2 | 6573.8 | 9490.9  | 13008.2 | 17862.4 | 18353.0 | 18283.2 | 16192.3 |
| 55°   | 3089.9 | 3117.3 | 3308.7 | 4311.8 | 6032.0 | 8778.6  | 13154.2 | 19027.7 | 19182.7 | 19171.3 | 16954.0 |
| 57.5° | 2936.7 | 2957.6 | 3093.5 | 3598.4 | 5437.2 | 7864.3  | 13030.8 | 19785.9 | 20026.7 | 19952.8 | 17672.9 |
| 60°   | 2715.6 | 2732.3 | 2934.9 | 3242.5 | 4825.0 | 6941.0  | 12272.1 | 20129.8 | 20638.8 | 20611.4 | 18308.3 |
| 62.5° | 2549.3 | 2577.9 | 2691.2 | 2979.7 | 4302.3 | 6180.4  | 11367.9 | 20022.5 | 21040.5 | 21065.0 | 18793.4 |
| 65°   | 2373.5 | 2399.1 | 2495.1 | 2747.2 | 3828.4 | 5680.4  | 10392.7 | 19484.9 | 20855.8 | 20920.7 | 18872.1 |
| 67.5° | 2156.5 | 2176.2 | 2290.0 | 2508.2 | 3274.7 | 5180.3  | 9293.0  | 18534.2 | 19830.6 | 20039.8 | 18088.9 |
| 70°   | 1883.5 | 1890.7 | 2030.1 | 2178.6 | 2719.2 | 4426.3  | 7389.2  | 16977.9 | 18347.0 | 18351.2 | 16610.1 |
| 72.5° | 1499.1 | 1505.0 | 1542.0 | 1654.6 | 2042.7 | 3503.0  | 5431.2  | 14186.0 | 16543.4 | 16513.0 | 14762.4 |
| 75°   | 1019.2 | 1071.7 | 1199.8 | 1307.1 | 1473.4 | 2459.9  | 3377.8  | 9557.7  | 14016.1 | 14254.5 | 12126.0 |
| 77.5° | 805.3  | 810.0  | 863.1  | 961.4  | 1105.1 | 1837.6  | 1893.1  | 5288.2  | 10449.3 | 11016.2 | 9531.4  |
| 80°   | 561.5  | 569.8  | 541.2  | 565.1  | 770.7  | 1257.7  | 1106.3  | 2301.3  | 4357.7  | 4652.8  | 5722.7  |
| 82.5° | 267.6  | 277.2  | 318.3  | 295.6  | 383.3  | 534.7   | 584.1   | 1189.1  | 1882.3  | 1931.8  | 2228.0  |
| 85°   | 176.4  | 176.4  | 177.0  | 167.5  | 223.5  | 233.1   | 265.2   | 507.2   | 919.1   | 950.1   | 944.7   |
| 87.5° | 56.6   | 62.6   | 60.8   | 70.9   | 85.8   | 77.5    | 81.1    | 159.1   | 315.3   | 312.3   | 261.1   |
| 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-CA6-230-727-U-T2

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5105.2  | 5105.2  | 5105.2 | 5105.2 | 5105.2 | 5105.2 | 5105.2 | 5105.2 | 5105.2 | 5105.2 | 5105.2 |
| 2.5°  | 5112.3  | 5087.9  | 5030.7 | 4980.6 | 4931.1 | 4893.6 | 4861.4 | 4818.5 | 4798.2 | 4779.7 | 4818.5 |
| 5°    | 5127.2  | 5083.7  | 4981.2 | 4878.7 | 4784.5 | 4715.3 | 4673.0 | 4642.0 | 4614.0 | 4614.0 | 4627.1 |
| 7.5°  | 5144.5  | 5085.5  | 4938.9 | 4793.4 | 4652.2 | 4573.5 | 4513.3 | 4473.9 | 4451.3 | 4452.5 | 4480.5 |
| 10°   | 5155.8  | 5065.2  | 4890.6 | 4694.5 | 4540.7 | 4414.3 | 4355.3 | 4298.7 | 4255.8 | 4230.2 | 4258.8 |
| 12.5° | 5168.9  | 5058.7  | 4825.6 | 4604.5 | 4417.3 | 4274.3 | 4151.5 | 4109.2 | 4067.4 | 4035.3 | 4050.8 |
| 15°   | 5250.0  | 5083.7  | 4771.4 | 4490.0 | 4273.1 | 4094.9 | 3933.9 | 3856.4 | 3844.5 | 3822.5 | 3827.8 |
| 17.5° | 5382.3  | 5151.1  | 4736.2 | 4350.0 | 4099.6 | 3889.2 | 3685.4 | 3585.2 | 3561.4 | 3550.1 | 3556.0 |
| 20°   | 5579.6  | 5279.2  | 4746.9 | 4251.6 | 3904.1 | 3668.7 | 3405.2 | 3287.8 | 3208.5 | 3213.3 | 3236.5 |
| 22.5° | 5881.2  | 5486.0  | 4805.4 | 4143.7 | 3692.5 | 3383.8 | 3117.9 | 2958.2 | 2878.3 | 2861.0 | 2887.3 |
| 25°   | 6361.6  | 5819.2  | 4869.7 | 4040.6 | 3488.1 | 3076.2 | 2781.8 | 2608.9 | 2506.4 | 2499.8 | 2529.0 |
| 27.5° | 6977.4  | 6330.0  | 5009.8 | 3951.2 | 3234.2 | 2706.7 | 2414.0 | 2266.2 | 2157.1 | 2144.0 | 2134.5 |
| 30°   | 7607.4  | 6897.5  | 5263.1 | 3815.3 | 2937.9 | 2325.2 | 2070.7 | 1955.0 | 1832.9 | 1783.4 | 1794.1 |
| 32.5° | 8275.0  | 7426.2  | 5559.9 | 3719.9 | 2606.5 | 1989.6 | 1768.5 | 1658.2 | 1546.2 | 1474.6 | 1457.9 |
| 35°   | 8947.3  | 7951.9  | 5809.7 | 3577.5 | 2292.4 | 1723.2 | 1511.6 | 1397.7 | 1300.0 | 1241.6 | 1237.4 |
| 37.5° | 9734.1  | 8499.1  | 6010.0 | 3426.1 | 1966.4 | 1514.6 | 1260.0 | 1194.5 | 1147.4 | 1096.1 | 1101.5 |
| 40°   | 10522.1 | 9136.8  | 6170.3 | 3175.8 | 1695.8 | 1290.4 | 1072.3 | 1085.4 | 1095.5 | 1052.6 | 1049.0 |
| 42.5° | 11176.5 | 9672.7  | 6243.6 | 2851.5 | 1456.1 | 1095.5 | 989.4  | 1049.0 | 1093.2 | 1065.1 | 1061.6 |
| 45°   | 11841.1 | 10123.9 | 6215.0 | 2449.2 | 1257.1 | 1002.6 | 982.9  | 1043.7 | 1100.3 | 1093.8 | 1090.8 |
| 47.5° | 12563.5 | 10715.2 | 6165.5 | 1990.8 | 1114.6 | 993.6  | 997.2  | 1025.8 | 1097.3 | 1109.2 | 1104.5 |
| 50°   | 13446.9 | 11259.4 | 5872.9 | 1550.3 | 1045.5 | 1007.9 | 1029.4 | 1014.5 | 1075.3 | 1099.7 | 1103.9 |
| 52.5° | 14326.0 | 11678.4 | 5481.3 | 1343.5 | 1018.1 | 1021.6 | 1074.1 | 1023.4 | 1050.2 | 1071.7 | 1091.4 |
| 55°   | 15004.4 | 12105.2 | 4847.7 | 1218.9 | 1009.1 | 1028.2 | 1086.6 | 1042.5 | 1041.9 | 1041.9 | 1048.5 |
| 57.5° | 15698.7 | 12676.8 | 4214.1 | 1138.5 | 993.6  | 1035.3 | 1071.7 | 1046.1 | 1037.7 | 1025.8 | 1018.1 |
| 60°   | 16182.1 | 12888.4 | 3399.9 | 1085.4 | 977.5  | 1025.2 | 1030.0 | 1026.4 | 1000.8 | 989.4  | 980.5  |
| 62.5° | 16611.3 | 13003.4 | 2647.1 | 1024.6 | 955.5  | 1001.4 | 976.3  | 968.6  | 953.7  | 926.3  | 931.0  |
| 65°   | 16496.3 | 12756.6 | 2017.0 | 956.1  | 940.0  | 972.8  | 929.2  | 910.8  | 912.0  | 883.3  | 892.9  |
| 67.5° | 15756.0 | 11649.8 | 1448.4 | 851.2  | 897.7  | 916.1  | 875.6  | 861.9  | 841.6  | 827.3  | 840.4  |
| 70°   | 14260.5 | 10327.2 | 976.9  | 706.3  | 801.1  | 841.0  | 814.2  | 790.4  | 758.8  | 749.2  | 763.5  |
| 72.5° | 12002.6 | 8620.7  | 674.1  | 568.0  | 691.4  | 743.3  | 733.1  | 708.7  | 686.1  | 709.3  | 737.3  |
| 75°   | 9860.4  | 6377.7  | 550.2  | 465.5  | 531.7  | 619.3  | 649.1  | 656.3  | 724.2  | 950.7  | 973.9  |
| 77.5° | 7097.8  | 3953.6  | 494.7  | 378.5  | 424.4  | 495.3  | 554.9  | 579.4  | 884.5  | 847.0  | 845.2  |
| 80°   | 4138.4  | 2304.3  | 377.3  | 298.6  | 343.3  | 363.0  | 433.9  | 680.1  | 762.9  | 654.5  | 638.4  |
| 82.5° | 1888.3  | 1016.9  | 262.9  | 239.0  | 238.4  | 240.2  | 295.6  | 654.5  | 585.3  | 515.6  | 496.5  |
| 85°   | 694.4   | 357.6   | 159.7  | 138.3  | 158.5  | 137.7  | 193.7  | 479.8  | 339.2  | 333.8  | 278.4  |
| 87.5° | 171.1   | 73.3    | 54.2   | 45.3   | 37.0   | 35.2   | 59.0   | 158.0  | 82.9   | 75.7   | 72.7   |
| 90°   | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



Report 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            |

REPORT NUMBER: SP1-2104-215-5

**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

REPORT NUMBER: SP1-2104-215-5

### Photopic Flux vs. Wavelength

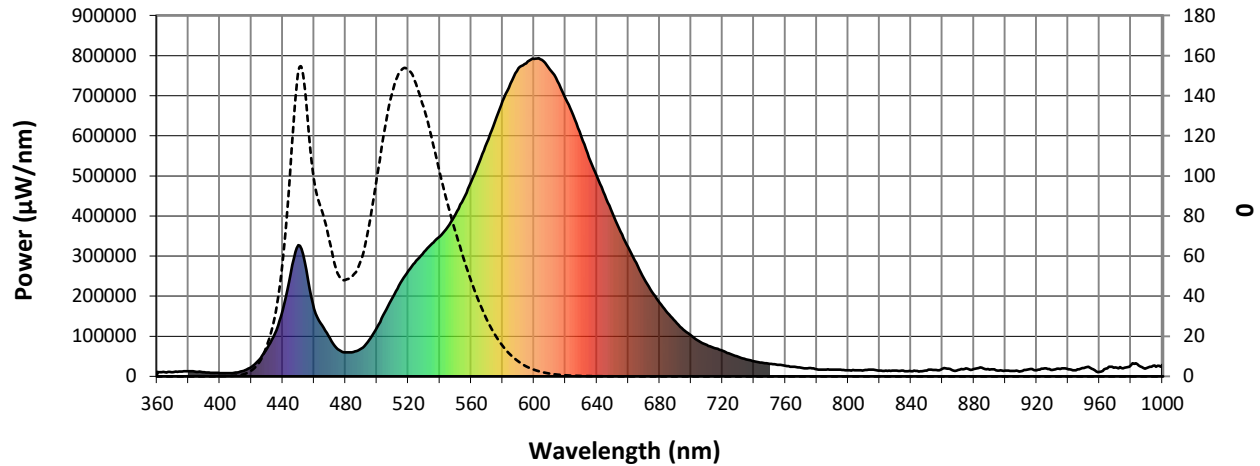


#####

| 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              |           |                  |                  |

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TM-30-18

### 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)