

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P510539

Luminaire Tested: **CTN-CA10-630-730-U-T3**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510539  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-11)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: CTN-CA10-630-730-U-T3  
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: 90783 lumens  
Efficiency: N/A  
Efficacy: 143.8 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B5 - U0 - G5

Input Watts (W): 631.4  
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



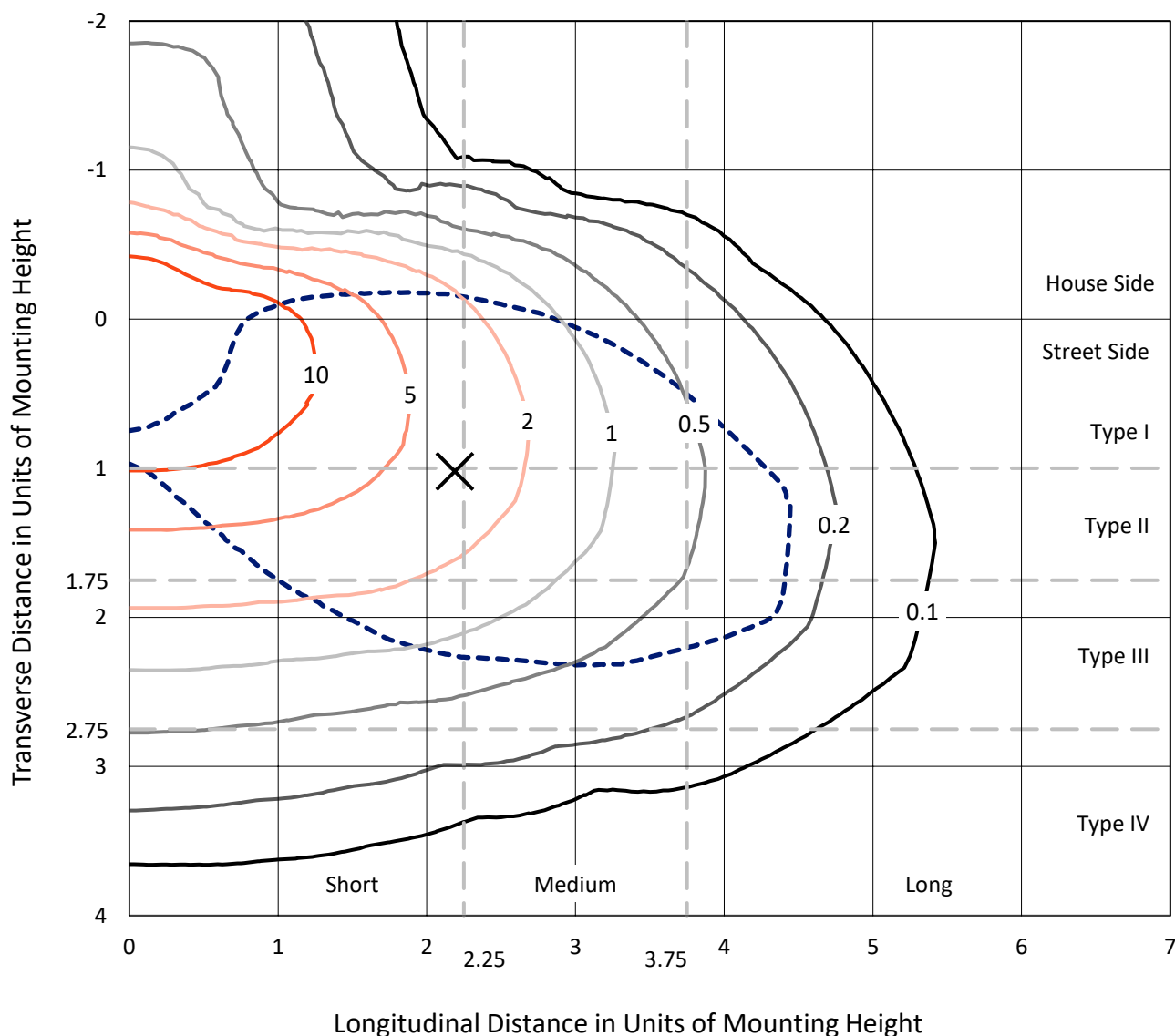
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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

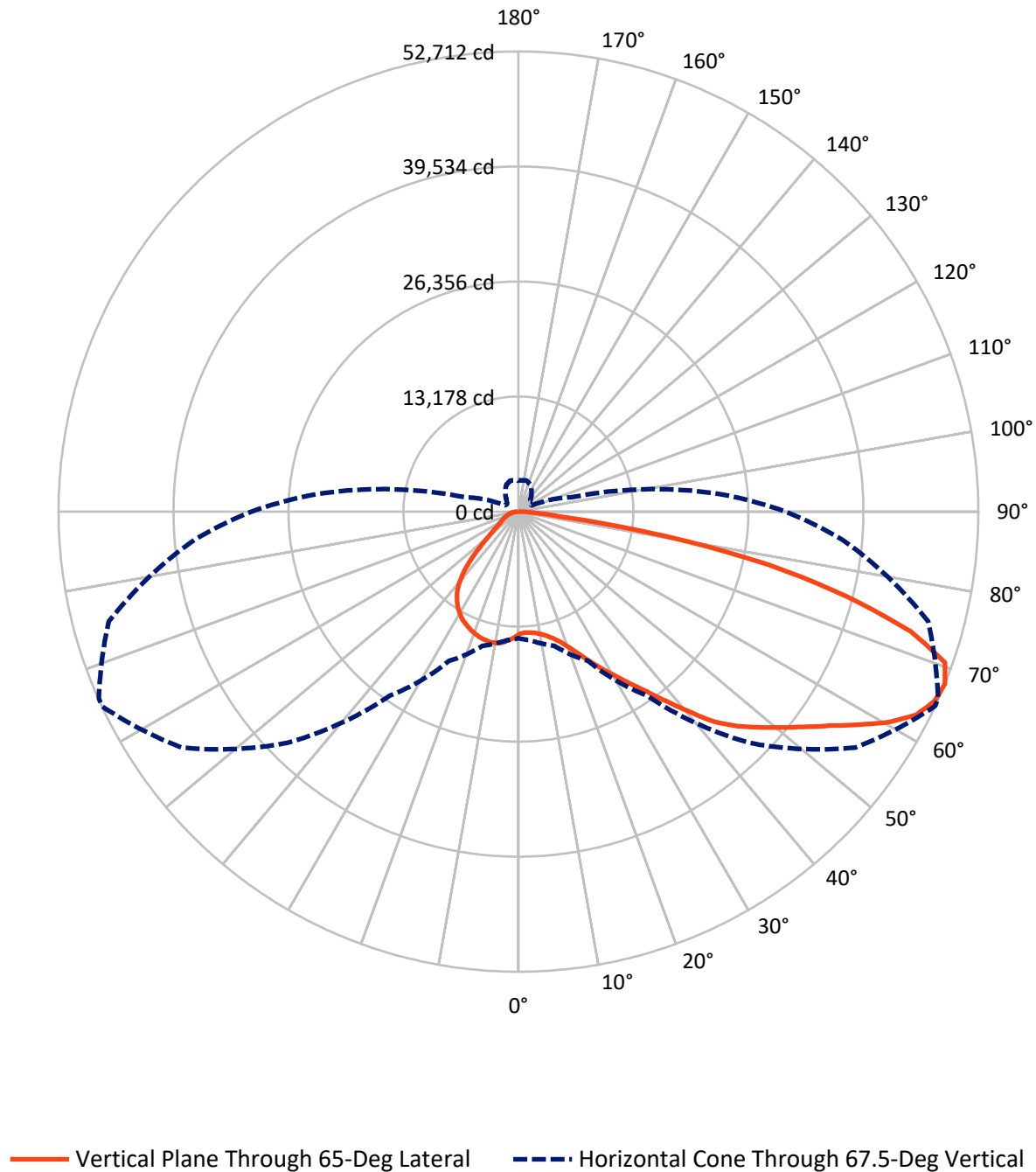


Based on 30 foot mounting height. Maximum calculated value = 17.3 fc

Type III - Short - N/A

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## Luminous Intensity Polar Plot



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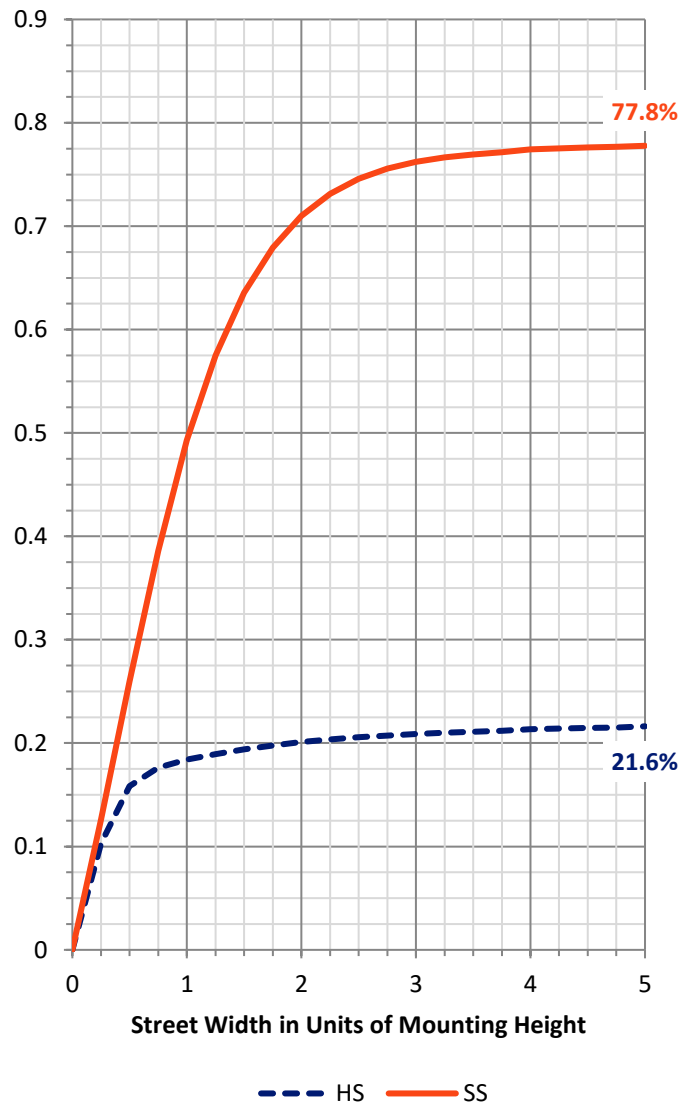
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 20052.8  | 0.0    | 20052.8 |
|                    | % Fixture | 22.1     | 0.0    | 22.1    |
| <b>Street Side</b> | Lumens    | 70730.2  | 0.0    | 70730.2 |
|                    | % Fixture | 77.9     | 0.0    | 77.9    |
| <b>Total</b>       | Lumens    | 90783.0  | 0.0    | 90783.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1397.1  | 1.5       |
| 10°-20°   | 4365.1  | 4.8       |
| 20°-30°   | 7556.6  | 8.3       |
| 30°-40°   | 11103.6 | 12.2      |
| 40°-50°   | 15007.9 | 16.5      |
| 50°-60°   | 18455.2 | 20.3      |
| 60°-70°   | 19775.9 | 21.8      |
| 70°-80°   | 11663.6 | 12.8      |
| 80°-90°   | 1457.9  | 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°    | 90783.0 | 100.0     |
| 0°-180°   | 90783.0 | 100.0     |

**Coefficient of Utilization**



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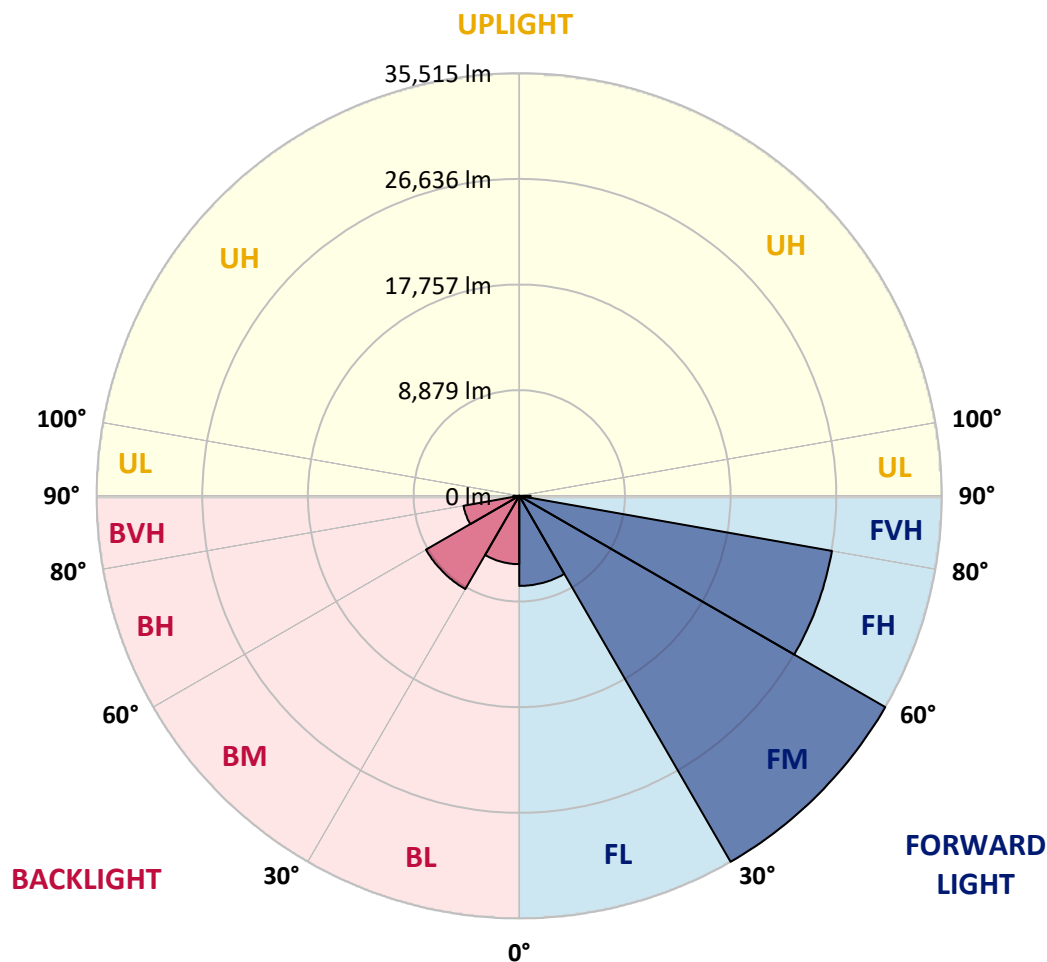
CATALOG NUMBER: CTN-CA10-630-730-U-T3

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 7575.1  | 8.3       |                         |      |         |
| FM   | (30°-60°)   | 35514.9 | 39.1      |                         |      |         |
| FH   | (60°-80°)   | 26684.1 | 29.4      |                         |      | G5      |
| FVH  | (80°-90°)   | 956.0   | 1.1       |                         |      | G5      |
| BL   | (0°-30°)    | 5743.7  | 6.3       | B5                      |      |         |
| BM   | (30°-60°)   | 9051.8  | 10.0      | B5                      |      |         |
| BH   | (60°-80°)   | 4755.5  | 5.2       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 501.9   | 0.6       |                         |      | G4/750  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

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

Type III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 66°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 |
| 2.5°  | 13757.9 | 13731.9 | 13720.8 | 13756.0 | 13781.9 | 13811.5 | 13854.1 | 13894.8 | 13900.4 | 13954.0 | 14024.4 |
| 5°    | 13924.4 | 13902.2 | 13878.2 | 13872.6 | 13863.4 | 13861.5 | 13872.6 | 13918.9 | 13930.0 | 13981.8 | 14133.6 |
| 7.5°  | 14294.6 | 14272.4 | 14228.0 | 14211.3 | 14161.4 | 14072.5 | 14029.9 | 14054.0 | 14059.6 | 14122.5 | 14311.3 |
| 10°   | 14898.0 | 14829.5 | 14775.9 | 14720.3 | 14563.0 | 14422.3 | 14318.7 | 14274.3 | 14265.0 | 14326.1 | 14544.5 |
| 12.5° | 15618.0 | 15560.6 | 15501.4 | 15355.2 | 15155.3 | 14901.7 | 14718.5 | 14616.7 | 14609.3 | 14661.1 | 14825.8 |
| 15°   | 16378.7 | 16378.7 | 16338.0 | 16164.0 | 15967.8 | 15547.7 | 15264.5 | 15094.2 | 15105.3 | 15146.0 | 15221.9 |
| 17.5° | 17361.6 | 17280.1 | 17261.6 | 17063.6 | 16845.2 | 16462.0 | 16012.3 | 15740.2 | 15753.1 | 15771.6 | 15714.3 |
| 20°   | 18361.1 | 18337.0 | 18309.3 | 18177.8 | 17979.8 | 17487.4 | 16982.1 | 16624.9 | 16626.8 | 16560.1 | 16304.7 |
| 22.5° | 19682.6 | 19603.0 | 19623.4 | 19475.3 | 19206.9 | 18701.6 | 18120.5 | 17696.6 | 17724.4 | 17628.1 | 17165.4 |
| 25°   | 20994.9 | 20915.3 | 20872.8 | 20772.8 | 20541.5 | 20062.1 | 19371.7 | 18983.0 | 18949.7 | 18775.7 | 18103.8 |
| 27.5° | 22305.4 | 22259.1 | 22294.3 | 22174.0 | 21985.2 | 21450.3 | 20817.2 | 20386.0 | 20408.2 | 20287.9 | 19286.5 |
| 30°   | 23662.1 | 23610.3 | 23763.9 | 23569.6 | 23452.9 | 22932.8 | 22325.7 | 21818.6 | 21837.1 | 21881.5 | 20758.0 |
| 32.5° | 24685.7 | 24746.7 | 25015.1 | 24992.9 | 24970.7 | 24391.4 | 23752.8 | 23471.5 | 23499.2 | 23654.7 | 22505.3 |
| 35°   | 25674.0 | 25679.6 | 26057.2 | 26342.2 | 26462.5 | 25977.6 | 25315.0 | 25305.7 | 25487.1 | 25960.9 | 24941.1 |
| 37.5° | 26494.0 | 26475.5 | 26978.9 | 27421.3 | 27750.8 | 27375.0 | 27010.4 | 27578.6 | 27743.4 | 28726.2 | 27393.5 |
| 40°   | 26941.9 | 26980.8 | 27628.6 | 28180.2 | 28828.0 | 28650.3 | 28689.2 | 30142.2 | 30547.5 | 31408.2 | 29227.8 |
| 42.5° | 26627.3 | 26745.7 | 27754.5 | 28879.8 | 29857.1 | 30094.0 | 30875.1 | 32911.1 | 33083.3 | 33238.7 | 31032.4 |
| 45°   | 26099.8 | 26223.8 | 27341.7 | 29159.3 | 30706.7 | 31708.0 | 33049.9 | 35041.5 | 35230.3 | 35056.3 | 32533.5 |
| 47.5° | 25550.0 | 25677.7 | 26923.4 | 29046.4 | 31410.0 | 33329.4 | 34984.1 | 36925.8 | 37166.4 | 36627.8 | 33977.2 |
| 50°   | 24852.2 | 25050.3 | 26412.6 | 28807.6 | 31980.1 | 35078.5 | 36814.7 | 38865.5 | 38976.6 | 38199.2 | 35071.1 |
| 52.5° | 23993.4 | 24211.8 | 25685.1 | 28398.6 | 32426.2 | 36300.1 | 38667.5 | 40970.0 | 40958.9 | 40035.3 | 36322.4 |
| 55°   | 23090.2 | 23288.2 | 24806.0 | 27754.5 | 32676.1 | 37240.4 | 40148.2 | 43289.2 | 43422.5 | 42648.8 | 37455.1 |
| 57.5° | 21933.3 | 22112.9 | 23767.6 | 26888.2 | 32416.9 | 38038.2 | 42547.0 | 46045.2 | 46111.8 | 44468.2 | 38356.5 |
| 60°   | 20400.8 | 20665.5 | 22327.6 | 25786.9 | 31672.9 | 38961.8 | 45190.1 | 48943.7 | 49025.2 | 46258.1 | 38935.8 |
| 62.5° | 18718.3 | 18823.8 | 20517.4 | 24091.5 | 30590.1 | 39674.4 | 47022.5 | 51211.1 | 51092.7 | 47657.4 | 39109.8 |
| 65°   | 16667.5 | 16750.8 | 18216.7 | 21911.1 | 28578.1 | 39283.8 | 47679.6 | 52377.2 | 52231.0 | 48536.5 | 38574.9 |
| 67.5° | 14520.4 | 14777.7 | 15929.0 | 18886.7 | 25770.3 | 37481.0 | 47124.3 | 52712.2 | 52638.2 | 48603.2 | 37297.8 |
| 70°   | 11733.0 | 11823.6 | 12863.9 | 15386.7 | 21502.1 | 33871.7 | 45273.4 | 51853.4 | 51796.0 | 47115.0 | 34689.8 |
| 72.5° | 8273.6  | 8184.7  | 8690.0  | 10668.7 | 15531.0 | 26943.8 | 38654.5 | 47028.0 | 47124.3 | 42147.2 | 30208.8 |
| 75°   | 4392.2  | 4562.5  | 5349.1  | 6531.9  | 8804.8  | 17320.9 | 30817.7 | 38921.0 | 38887.7 | 35243.3 | 23878.7 |
| 77.5° | 2339.6  | 2335.9  | 2876.3  | 3381.6  | 4310.8  | 7958.9  | 20326.7 | 29351.8 | 29514.7 | 27306.5 | 16395.4 |
| 80°   | 1123.5  | 1166.1  | 1199.4  | 1375.2  | 2148.9  | 3677.8  | 8503.1  | 17021.0 | 18131.6 | 16286.2 | 7788.7  |
| 82.5° | 899.5   | 903.2   | 906.9   | 868.1   | 888.4   | 1497.4  | 3276.1  | 4925.3  | 5103.0  | 4101.6  | 2511.7  |
| 85°   | 666.3   | 625.6   | 620.1   | 525.7   | 594.1   | 899.5   | 1652.9  | 2102.6  | 1999.0  | 1945.3  | 1417.8  |
| 87.5° | 268.4   | 251.7   | 244.3   | 229.5   | 229.5   | 338.7   | 583.0   | 760.7   | 758.9   | 692.2   | 475.7   |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°    | 125°    | 135°    | 145°    | 155°    | 165°    | 175°    | 180°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 | 14022.5 |
| 2.5°  | 14079.9 | 14146.5 | 14302.0 | 14435.3 | 14485.3 | 14607.4 | 14722.2 | 14788.8 | 14835.1 | 14862.8 | 14988.7 |
| 5°    | 14226.1 | 14359.4 | 14607.4 | 14794.4 | 14975.8 | 15201.6 | 15347.8 | 15440.3 | 15492.2 | 15521.8 | 15612.5 |
| 7.5°  | 14450.1 | 14585.2 | 14848.0 | 15134.9 | 15301.5 | 15486.6 | 15581.0 | 15647.6 | 15681.0 | 15671.7 | 15743.9 |
| 10°   | 14650.0 | 14783.3 | 15046.1 | 15266.3 | 15360.7 | 15466.2 | 15516.2 | 15531.0 | 15532.9 | 15540.3 | 15612.5 |
| 12.5° | 14922.1 | 15003.5 | 15144.2 | 15288.6 | 15268.2 | 15271.9 | 15314.5 | 15296.0 | 15253.4 | 15246.0 | 15294.1 |
| 15°   | 15214.5 | 15216.4 | 15227.5 | 15196.0 | 15068.3 | 15012.8 | 14953.5 | 14903.6 | 14787.0 | 14779.6 | 14855.4 |
| 17.5° | 15581.0 | 15494.0 | 15292.3 | 15077.6 | 14774.0 | 14564.9 | 14353.8 | 14266.9 | 14124.3 | 14096.6 | 14133.6 |
| 20°   | 16053.0 | 15871.6 | 15381.1 | 14848.0 | 14279.8 | 13905.9 | 13650.5 | 13393.2 | 13195.2 | 13147.0 | 13182.2 |
| 22.5° | 16730.4 | 16373.2 | 15494.0 | 14603.7 | 13724.5 | 13086.0 | 12589.9 | 12280.8 | 11947.7 | 11777.4 | 11794.0 |
| 25°   | 17548.5 | 16989.5 | 15690.2 | 14294.6 | 13071.2 | 12149.4 | 11344.3 | 10724.2 | 10348.5 | 10098.6 | 10165.2 |
| 27.5° | 18620.2 | 17852.1 | 15925.3 | 13989.2 | 12258.6 | 10951.9 | 9783.9  | 8943.6  | 8560.5  | 8442.0  | 8364.3  |
| 30°   | 19862.2 | 18894.1 | 16173.3 | 13537.6 | 11381.3 | 9469.3  | 7973.7  | 7274.1  | 6835.4  | 6765.1  | 6705.9  |
| 32.5° | 21524.3 | 20206.4 | 16637.9 | 13047.1 | 10333.7 | 7986.7  | 6363.4  | 5558.3  | 5458.3  | 5401.0  | 5388.0  |
| 35°   | 23667.7 | 21925.9 | 17124.7 | 12410.4 | 8967.7  | 6248.7  | 4814.2  | 4379.3  | 4331.1  | 4394.1  | 4399.6  |
| 37.5° | 25942.4 | 23791.7 | 17707.7 | 11692.2 | 7396.3  | 4662.5  | 3683.3  | 3381.6  | 3435.3  | 3631.5  | 3675.9  |
| 40°   | 27482.4 | 25020.7 | 18237.1 | 10716.8 | 5454.6  | 3387.2  | 2680.1  | 2615.3  | 2911.5  | 3163.2  | 3215.0  |
| 42.5° | 28959.4 | 25951.7 | 18451.8 | 9426.7  | 3890.6  | 2411.7  | 2163.7  | 2385.8  | 2800.4  | 3076.2  | 3113.2  |
| 45°   | 30219.9 | 27034.5 | 17911.3 | 7879.3  | 2637.6  | 2015.6  | 2073.0  | 2380.3  | 2841.2  | 3146.6  | 3174.3  |
| 47.5° | 31419.3 | 27919.2 | 17172.8 | 6208.0  | 2080.4  | 1939.8  | 2071.2  | 2430.3  | 2931.8  | 3220.6  | 3237.3  |
| 50°   | 32565.0 | 28592.9 | 15912.3 | 4723.5  | 1949.0  | 1904.6  | 2087.8  | 2508.0  | 2981.8  | 3163.2  | 3155.8  |
| 52.5° | 33414.6 | 28940.9 | 14570.4 | 3812.9  | 1897.2  | 1876.8  | 2132.3  | 2606.1  | 2991.1  | 3100.3  | 3092.9  |
| 55°   | 34038.3 | 28874.3 | 13689.4 | 3122.5  | 1854.6  | 1865.7  | 2204.4  | 2680.1  | 3079.9  | 3244.7  | 3239.1  |
| 57.5° | 34095.7 | 28572.6 | 12688.0 | 2637.6  | 1802.8  | 1863.9  | 2282.2  | 2783.8  | 3524.1  | 3827.7  | 3735.1  |
| 60°   | 34027.2 | 28072.8 | 11688.5 | 2315.5  | 1745.4  | 1875.0  | 2363.6  | 3094.7  | 4164.6  | 4403.3  | 4338.5  |
| 62.5° | 33690.4 | 27141.8 | 10191.1 | 2102.6  | 1695.4  | 1915.7  | 2424.7  | 3340.9  | 4133.1  | 4160.9  | 4068.3  |
| 65°   | 32650.1 | 25896.2 | 8225.5  | 1887.9  | 1645.5  | 1943.5  | 2474.7  | 3405.7  | 3796.2  | 3707.4  | 3661.1  |
| 67.5° | 30591.9 | 23114.2 | 6344.9  | 1691.7  | 1580.7  | 1937.9  | 2622.7  | 3313.1  | 3668.5  | 3603.7  | 3544.5  |
| 70°   | 27667.5 | 19952.9 | 4405.2  | 1490.0  | 1471.5  | 1902.7  | 2585.7  | 3344.6  | 3607.4  | 3507.5  | 3427.9  |
| 72.5° | 23114.2 | 15653.2 | 2802.3  | 1325.3  | 1308.6  | 1819.4  | 2493.2  | 3324.2  | 3566.7  | 3522.3  | 3413.1  |
| 75°   | 17404.2 | 10926.0 | 1780.6  | 1145.7  | 1164.2  | 1667.7  | 2345.1  | 3215.0  | 3546.4  | 3407.5  | 3198.4  |
| 77.5° | 10957.4 | 5393.6  | 1384.5  | 973.6   | 1001.3  | 1438.2  | 2026.8  | 2807.8  | 3403.8  | 3320.5  | 3052.2  |
| 80°   | 4144.2  | 2189.6  | 1082.8  | 790.3   | 814.4   | 1118.0  | 1662.1  | 2309.9  | 3133.6  | 3270.6  | 3155.8  |
| 82.5° | 1908.3  | 1369.7  | 812.6   | 634.9   | 644.1   | 814.4   | 1240.1  | 1710.2  | 2652.4  | 3002.2  | 3289.1  |
| 85°   | 1114.3  | 897.7   | 542.3   | 423.9   | 440.5   | 481.2   | 697.8   | 1043.9  | 1719.5  | 2289.6  | 2561.7  |
| 87.5° | 379.4   | 312.8   | 211.0   | 179.5   | 174.0   | 198.0   | 168.4   | 342.4   | 510.9   | 899.5   | 1027.3  |
| 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



#####

| 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



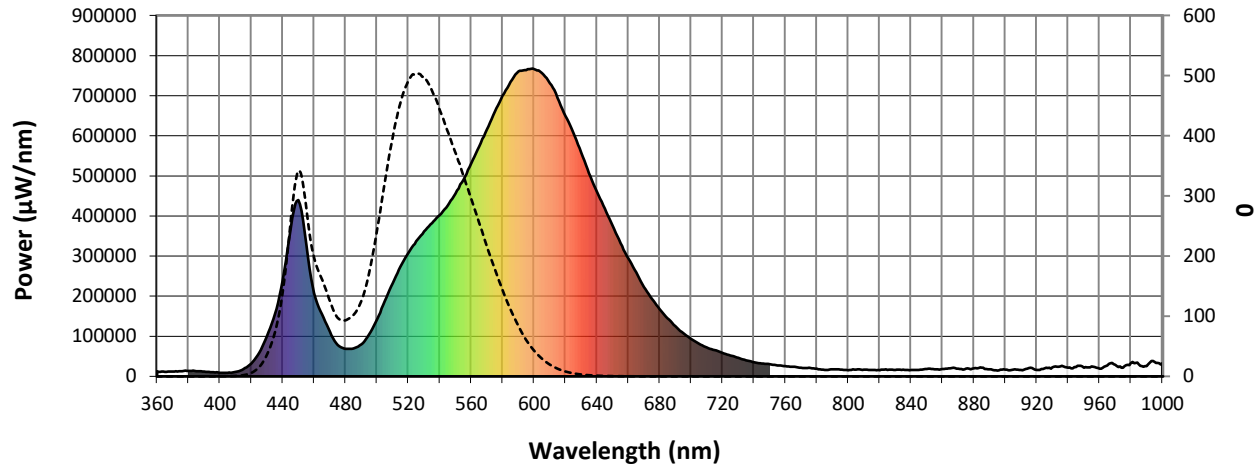
Scotopic Lumens: 43125.2

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

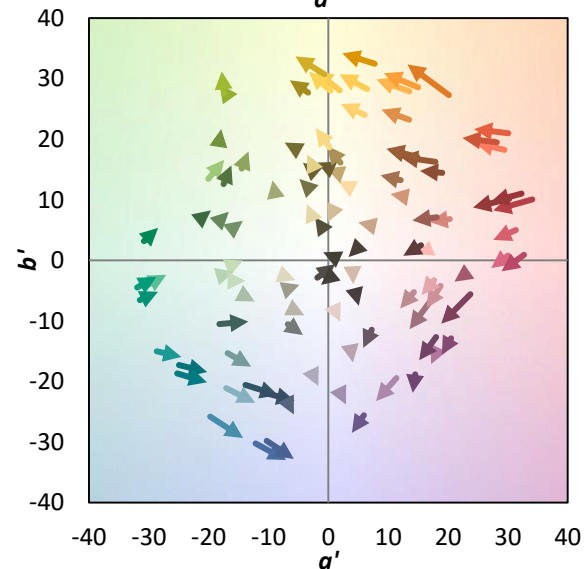
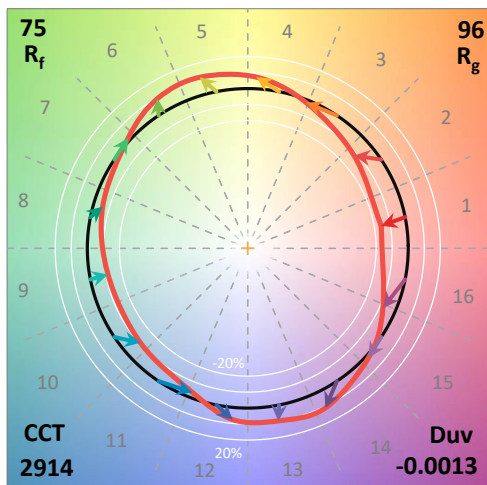
### Summary

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

### Spectral Power Distribution Comparison



### 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)