

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: STREETWORKS

Report Number: P510569

Luminaire Tested: **CST-CA10-630-760-U-T3**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510569  
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: STREETWORKS  
Catalog Number: CST-CA10-630-760-U-T3  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (10) 5700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 92157 lumens  
Efficiency: N/A  
Efficacy: 146.0 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B5 - U0 - G5

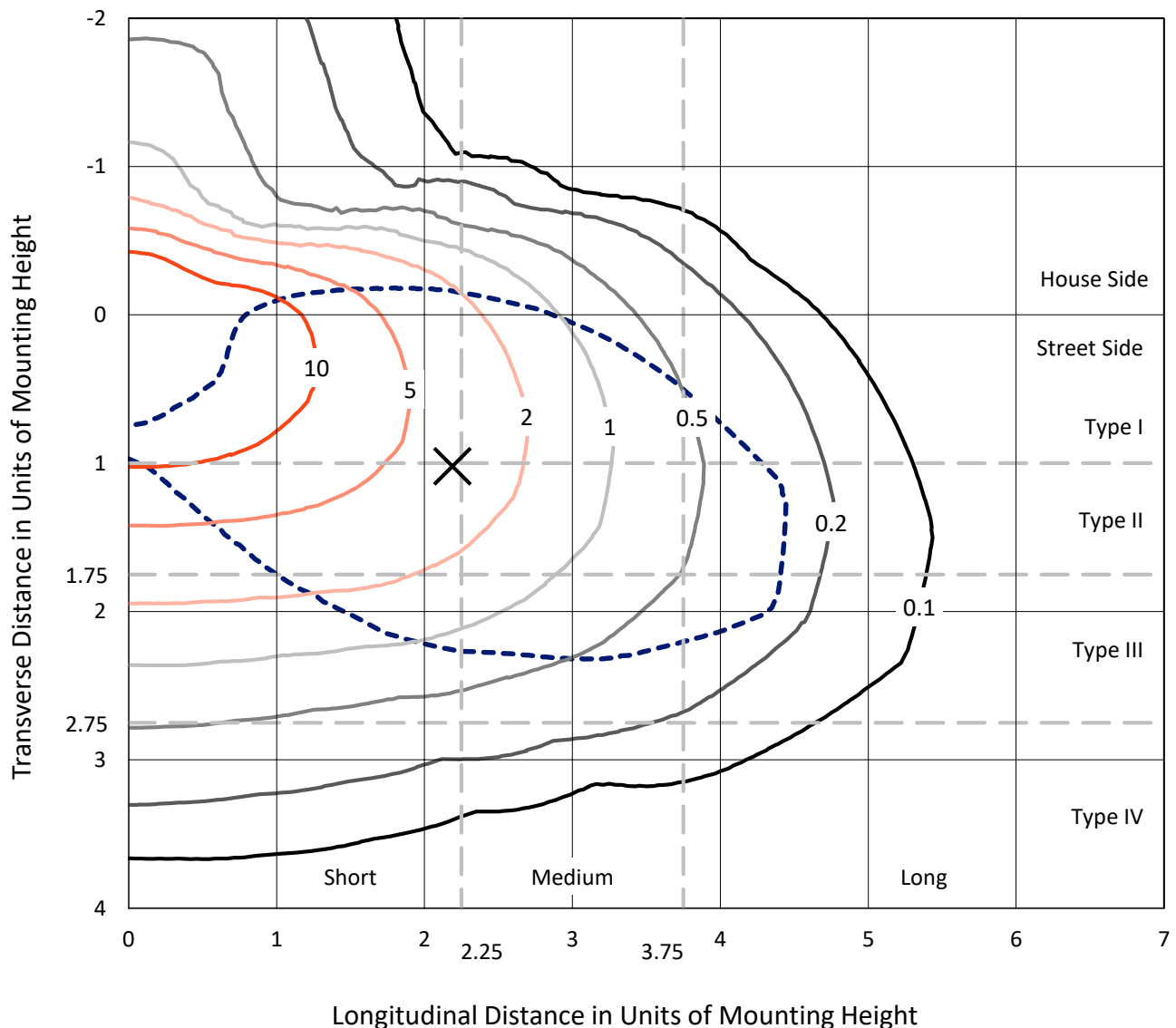
Input Watts (W): 631.4  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P510569  
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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

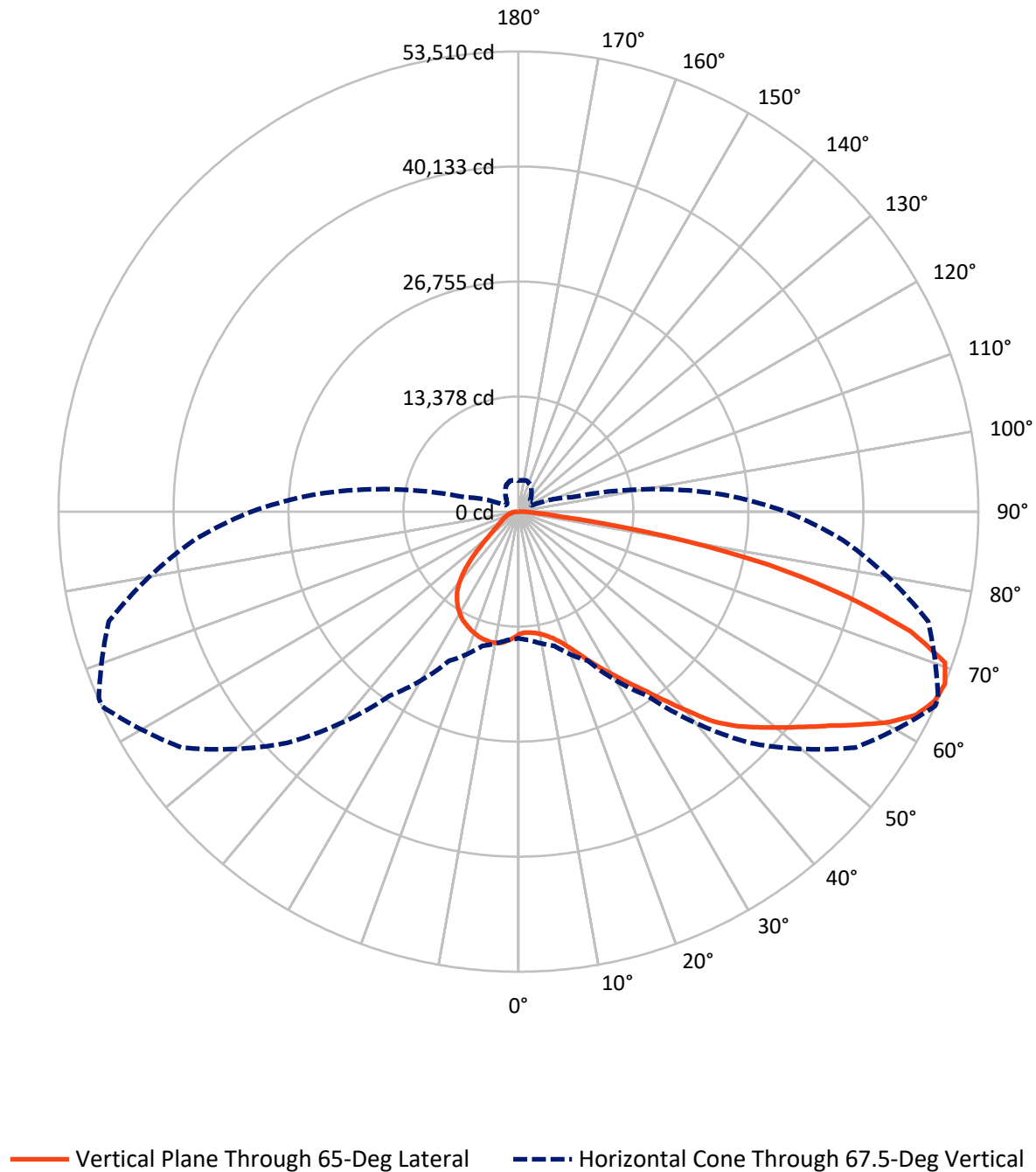


Based on 30 foot mounting height. Maximum calculated value = 17.6 fc  
 Type III - Short - N/A

FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

REPORT NUMBER: P510569  
CATALOG NUMBER: CST-CA10-630-760-U-T3

## Luminous Intensity Polar Plot



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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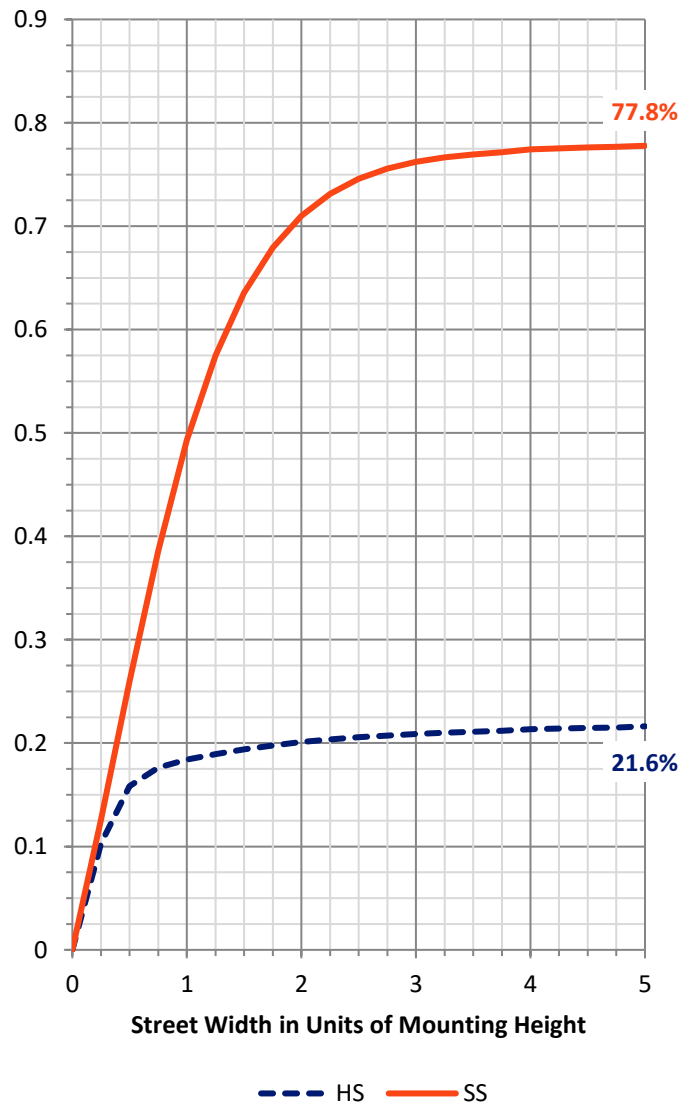
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 20356.3  | 0.0    | 20356.3 |
|                    | % Fixture | 22.1     | 0.0    | 22.1    |
| <b>Street Side</b> | Lumens    | 71800.7  | 0.0    | 71800.7 |
|                    | % Fixture | 77.9     | 0.0    | 77.9    |
| <b>Total</b>       | Lumens    | 92157.0  | 0.0    | 92157.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1418.3  | 1.5       |
| 10°-20°   | 4431.2  | 4.8       |
| 20°-30°   | 7670.9  | 8.3       |
| 30°-40°   | 11271.6 | 12.2      |
| 40°-50°   | 15235.0 | 16.5      |
| 50°-60°   | 18734.5 | 20.3      |
| 60°-70°   | 20075.3 | 21.8      |
| 70°-80°   | 11840.2 | 12.8      |
| 80°-90°   | 1480.0  | 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°    | 92157.0 | 100.0     |
| 0°-180°   | 92157.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P510569

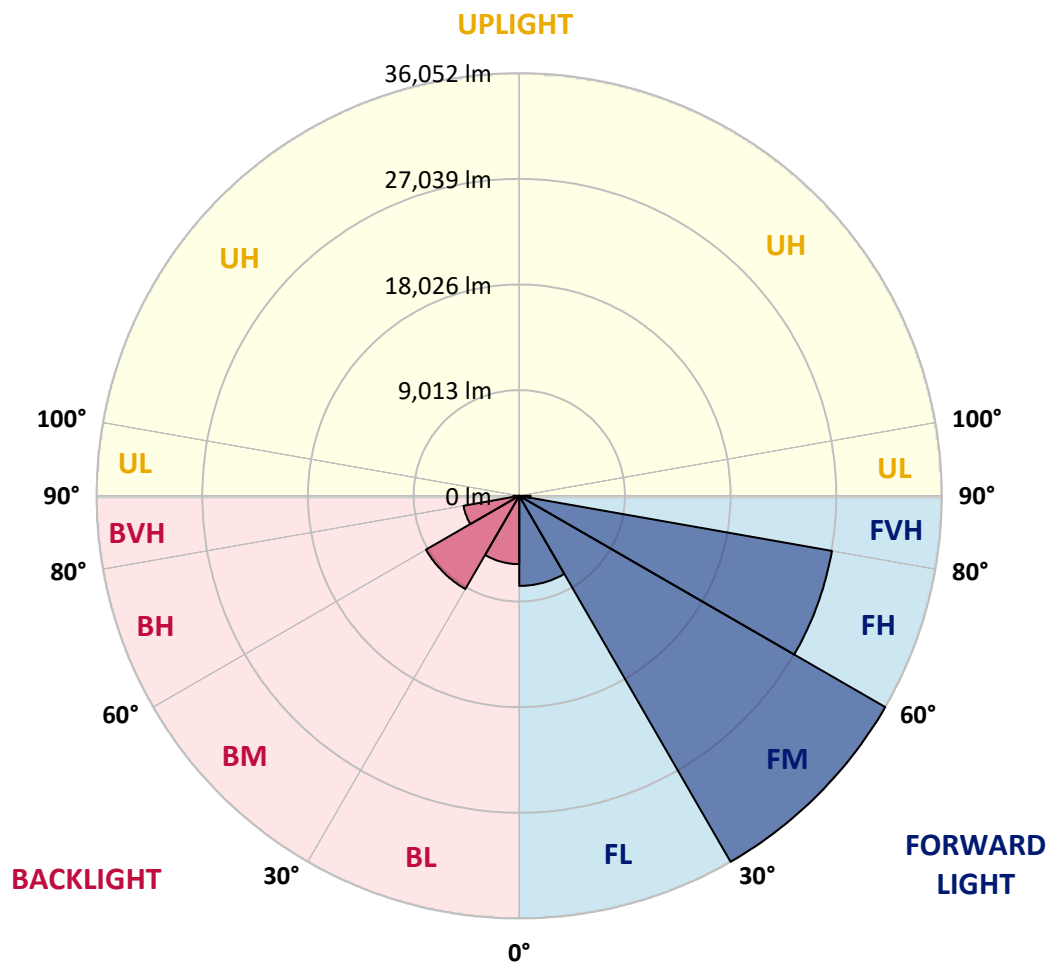
CATALOG NUMBER: CST-CA10-630-760-U-T3

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 7689.8  | 8.3       |                         |      |         |
| FM   | (30°-60°)   | 36052.4 | 39.1      |                         |      |         |
| FH   | (60°-80°)   | 27088.0 | 29.4      |                         |      | G5      |
| FVH  | (80°-90°)   | 970.5   | 1.1       |                         |      | G5      |
| BL   | (0°-30°)    | 5830.6  | 6.3       | B5                      |      |         |
| BM   | (30°-60°)   | 9188.8  | 10.0      | B5                      |      |         |
| BH   | (60°-80°)   | 4827.4  | 5.2       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 509.5   | 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



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 66°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 |
| 2.5°  | 13966.1 | 13939.8 | 13928.5 | 13964.2 | 13990.5 | 14020.6 | 14063.8 | 14105.1 | 14110.8 | 14165.2 | 14236.6 |
| 5°    | 14135.2 | 14112.6 | 14088.2 | 14082.6 | 14073.2 | 14071.3 | 14082.6 | 14129.5 | 14140.8 | 14193.4 | 14347.5 |
| 7.5°  | 14511.0 | 14488.4 | 14443.3 | 14426.4 | 14375.7 | 14285.5 | 14242.3 | 14266.7 | 14272.3 | 14336.2 | 14527.9 |
| 10°   | 15123.5 | 15054.0 | 14999.5 | 14943.1 | 14783.4 | 14640.6 | 14535.4 | 14490.3 | 14480.9 | 14542.9 | 14764.6 |
| 12.5° | 15854.4 | 15796.2 | 15736.0 | 15587.6 | 15384.7 | 15127.3 | 14941.2 | 14837.9 | 14830.4 | 14883.0 | 15050.2 |
| 15°   | 16626.6 | 16626.6 | 16585.3 | 16408.7 | 16209.5 | 15783.0 | 15495.5 | 15322.7 | 15333.9 | 15375.3 | 15452.3 |
| 17.5° | 17624.4 | 17541.7 | 17522.9 | 17321.8 | 17100.1 | 16711.2 | 16254.6 | 15978.4 | 15991.6 | 16010.4 | 15952.1 |
| 20°   | 18639.0 | 18614.5 | 18586.4 | 18453.0 | 18251.9 | 17752.1 | 17239.2 | 16876.5 | 16878.4 | 16810.8 | 16551.5 |
| 22.5° | 19980.5 | 19899.7 | 19920.4 | 19770.1 | 19497.6 | 18984.7 | 18394.7 | 17964.4 | 17992.6 | 17894.9 | 17425.2 |
| 25°   | 21312.7 | 21231.9 | 21188.7 | 21087.2 | 20852.3 | 20365.7 | 19664.9 | 19270.3 | 19236.5 | 19059.9 | 18377.8 |
| 27.5° | 22643.0 | 22596.0 | 22631.7 | 22509.6 | 22317.9 | 21774.9 | 21132.3 | 20694.5 | 20717.1 | 20594.9 | 19578.4 |
| 30°   | 24020.2 | 23967.6 | 24123.6 | 23926.3 | 23807.9 | 23279.9 | 22663.6 | 22148.8 | 22167.6 | 22212.7 | 21072.2 |
| 32.5° | 25059.3 | 25121.3 | 25393.7 | 25371.2 | 25348.6 | 24760.5 | 24112.3 | 23826.7 | 23854.9 | 24012.7 | 22845.9 |
| 35°   | 26062.6 | 26068.3 | 26451.6 | 26740.9 | 26863.0 | 26370.8 | 25698.1 | 25688.7 | 25872.8 | 26353.9 | 25318.6 |
| 37.5° | 26895.0 | 26876.2 | 27387.3 | 27836.3 | 28170.8 | 27789.4 | 27419.2 | 27996.0 | 28163.3 | 29161.0 | 27808.1 |
| 40°   | 27349.7 | 27389.1 | 28046.8 | 28606.7 | 29264.3 | 29083.9 | 29123.4 | 30598.4 | 31009.8 | 31883.5 | 29670.2 |
| 42.5° | 27030.3 | 27150.5 | 28174.5 | 29316.9 | 30309.0 | 30549.5 | 31342.4 | 33409.2 | 33584.0 | 33741.8 | 31502.1 |
| 45°   | 26494.8 | 26620.7 | 27755.5 | 29600.6 | 31171.4 | 32187.9 | 33550.1 | 35571.9 | 35763.5 | 35586.9 | 33025.9 |
| 47.5° | 25936.7 | 26066.4 | 27330.9 | 29486.0 | 31885.4 | 33833.9 | 35513.6 | 37484.6 | 37728.9 | 37182.1 | 34491.5 |
| 50°   | 25228.4 | 25429.4 | 26812.3 | 29243.6 | 32464.1 | 35609.5 | 37371.9 | 39453.7 | 39566.5 | 38777.3 | 35601.9 |
| 52.5° | 24356.6 | 24578.3 | 26073.9 | 28828.4 | 32916.9 | 36849.5 | 39252.7 | 41590.1 | 41578.8 | 40641.2 | 36872.1 |
| 55°   | 23439.6 | 23640.7 | 25181.4 | 28174.5 | 33170.6 | 37804.0 | 40755.8 | 43944.4 | 44079.7 | 43294.3 | 38022.0 |
| 57.5° | 22265.3 | 22447.6 | 24127.3 | 27295.2 | 32907.6 | 38613.9 | 43190.9 | 46742.1 | 46809.7 | 45141.3 | 38937.0 |
| 60°   | 20709.6 | 20978.2 | 22665.5 | 26177.2 | 32152.2 | 39551.4 | 45874.0 | 49684.5 | 49767.2 | 46958.2 | 39525.1 |
| 62.5° | 19001.6 | 19108.7 | 20827.9 | 24456.1 | 31053.1 | 40274.8 | 47734.2 | 51986.2 | 51865.9 | 48378.7 | 39701.8 |
| 65°   | 16919.8 | 17004.3 | 18492.4 | 22242.8 | 29010.7 | 39878.4 | 48401.2 | 53169.9 | 53021.5 | 49271.1 | 39158.8 |
| 67.5° | 14740.2 | 15001.4 | 16170.1 | 19172.6 | 26160.3 | 38048.3 | 47837.5 | 53510.0 | 53434.8 | 49338.8 | 37862.3 |
| 70°   | 11910.5 | 12002.6 | 13058.6 | 15619.5 | 21827.5 | 34384.4 | 45958.6 | 52638.2 | 52579.9 | 47828.1 | 35214.9 |
| 72.5° | 8398.8  | 8308.6  | 8821.6  | 10830.1 | 15766.1 | 27351.6 | 39239.5 | 47739.8 | 47837.5 | 42785.1 | 30666.0 |
| 75°   | 4458.7  | 4631.6  | 5430.1  | 6630.7  | 8938.1  | 17583.0 | 31284.2 | 39510.1 | 39476.3 | 35776.7 | 24240.1 |
| 77.5° | 2375.0  | 2371.2  | 2919.9  | 3432.8  | 4376.0  | 8079.4  | 20634.4 | 29796.0 | 29961.4 | 27719.8 | 16643.5 |
| 80°   | 1140.5  | 1183.7  | 1217.5  | 1396.0  | 2181.4  | 3733.4  | 8631.8  | 17278.6 | 18406.0 | 16532.7 | 7906.5  |
| 82.5° | 913.2   | 916.9   | 920.7   | 881.2   | 901.9   | 1520.1  | 3325.7  | 4999.8  | 5180.2  | 4163.7  | 2549.7  |
| 85°   | 676.4   | 635.1   | 629.4   | 533.6   | 603.1   | 913.2   | 1677.9  | 2134.5  | 2029.2  | 1974.8  | 1439.3  |
| 87.5° | 272.4   | 255.5   | 248.0   | 233.0   | 233.0   | 343.8   | 591.9   | 772.2   | 770.4   | 702.7   | 482.9   |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



REPORT NUMBER: P510569

CATALOG NUMBER: CST-CA10-630-760-U-T3

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°    | 125°    | 135°    | 145°    | 155°    | 165°    | 175°    | 180°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 | 14234.8 |
| 2.5°  | 14293.0 | 14360.7 | 14518.5 | 14653.8 | 14704.5 | 14828.5 | 14945.0 | 15012.6 | 15059.6 | 15087.8 | 15215.6 |
| 5°    | 14441.4 | 14576.7 | 14828.5 | 15018.3 | 15202.4 | 15431.6 | 15580.1 | 15674.0 | 15726.6 | 15756.7 | 15848.8 |
| 7.5°  | 14668.8 | 14806.0 | 15072.8 | 15364.0 | 15533.1 | 15721.0 | 15816.8 | 15884.5 | 15918.3 | 15908.9 | 15982.2 |
| 10°   | 14871.7 | 15007.0 | 15273.8 | 15497.4 | 15593.2 | 15700.3 | 15751.1 | 15766.1 | 15768.0 | 15775.5 | 15848.8 |
| 12.5° | 15147.9 | 15230.6 | 15373.4 | 15520.0 | 15499.3 | 15503.0 | 15546.3 | 15527.5 | 15484.3 | 15476.7 | 15525.6 |
| 15°   | 15444.8 | 15446.7 | 15457.9 | 15426.0 | 15296.4 | 15240.0 | 15179.9 | 15129.1 | 15010.8 | 15003.2 | 15080.3 |
| 17.5° | 15816.8 | 15728.5 | 15523.7 | 15305.8 | 14997.6 | 14785.3 | 14571.1 | 14482.8 | 14338.1 | 14309.9 | 14347.5 |
| 20°   | 16295.9 | 16111.8 | 15613.9 | 15072.8 | 14495.9 | 14116.4 | 13857.1 | 13595.9 | 13394.9 | 13346.0 | 13381.7 |
| 22.5° | 16983.6 | 16621.0 | 15728.5 | 14824.7 | 13932.3 | 13284.0 | 12780.5 | 12466.7 | 12128.5 | 11955.6 | 11972.5 |
| 25°   | 17814.1 | 17246.7 | 15927.7 | 14511.0 | 13269.0 | 12333.3 | 11516.0 | 10886.5 | 10505.1 | 10251.4 | 10319.1 |
| 27.5° | 18902.0 | 18122.3 | 16166.3 | 14200.9 | 12444.1 | 11117.6 | 9932.0  | 9079.0  | 8690.0  | 8569.8  | 8490.9  |
| 30°   | 20162.8 | 19180.1 | 16418.1 | 13742.5 | 11553.5 | 9612.6  | 8094.4  | 7384.2  | 6938.9  | 6867.5  | 6807.4  |
| 32.5° | 21850.1 | 20512.3 | 16889.7 | 13244.6 | 10490.1 | 8107.6  | 6459.8  | 5642.4  | 5541.0  | 5482.7  | 5469.6  |
| 35°   | 24025.9 | 22257.8 | 17383.8 | 12598.2 | 9103.4  | 6343.3  | 4887.1  | 4445.5  | 4396.7  | 4460.6  | 4466.2  |
| 37.5° | 26335.1 | 24151.7 | 17975.7 | 11869.2 | 7508.2  | 4733.0  | 3739.1  | 3432.8  | 3487.3  | 3686.5  | 3731.6  |
| 40°   | 27898.3 | 25399.4 | 18513.1 | 10879.0 | 5537.2  | 3438.4  | 2720.7  | 2654.9  | 2955.6  | 3211.1  | 3263.7  |
| 42.5° | 29397.7 | 26344.5 | 18731.0 | 9569.4  | 3949.5  | 2448.2  | 2196.5  | 2421.9  | 2842.8  | 3122.8  | 3160.4  |
| 45°   | 30677.3 | 27443.6 | 18182.4 | 7998.6  | 2677.5  | 2046.2  | 2104.4  | 2416.3  | 2884.2  | 3194.2  | 3222.4  |
| 47.5° | 31894.8 | 28341.8 | 17432.7 | 6301.9  | 2111.9  | 1969.1  | 2102.5  | 2467.0  | 2976.2  | 3269.3  | 3286.2  |
| 50°   | 33057.9 | 29025.7 | 16153.1 | 4795.0  | 1978.5  | 1933.4  | 2119.4  | 2545.9  | 3027.0  | 3211.1  | 3203.6  |
| 52.5° | 33920.3 | 29378.9 | 14790.9 | 3870.6  | 1925.9  | 1905.2  | 2164.5  | 2645.5  | 3036.3  | 3147.2  | 3139.7  |
| 55°   | 34553.5 | 29311.3 | 13896.6 | 3169.8  | 1882.7  | 1894.0  | 2237.8  | 2720.7  | 3126.5  | 3293.8  | 3288.1  |
| 57.5° | 34611.7 | 29005.0 | 12880.1 | 2677.5  | 1830.1  | 1892.1  | 2316.7  | 2825.9  | 3577.5  | 3885.6  | 3791.7  |
| 60°   | 34542.2 | 28497.7 | 11865.4 | 2350.5  | 1771.8  | 1903.4  | 2399.4  | 3141.6  | 4227.6  | 4470.0  | 4404.2  |
| 62.5° | 34200.3 | 27552.6 | 10345.4 | 2134.5  | 1721.1  | 1944.7  | 2461.4  | 3391.5  | 4195.6  | 4223.8  | 4129.9  |
| 65°   | 33144.3 | 26288.1 | 8350.0  | 1916.5  | 1670.4  | 1972.9  | 2512.1  | 3457.2  | 3853.7  | 3763.5  | 3716.5  |
| 67.5° | 31054.9 | 23464.1 | 6441.0  | 1717.3  | 1604.6  | 1967.2  | 2662.4  | 3363.3  | 3724.0  | 3658.3  | 3598.1  |
| 70°   | 28086.2 | 20254.9 | 4471.9  | 1512.5  | 1493.7  | 1931.5  | 2624.9  | 3395.2  | 3662.0  | 3560.6  | 3479.8  |
| 72.5° | 23464.1 | 15890.1 | 2844.7  | 1345.3  | 1328.4  | 1847.0  | 2530.9  | 3374.6  | 3620.7  | 3575.6  | 3464.7  |
| 75°   | 17667.6 | 11091.3 | 1807.5  | 1163.1  | 1181.8  | 1692.9  | 2380.6  | 3263.7  | 3600.0  | 3459.1  | 3246.8  |
| 77.5° | 11123.3 | 5475.2  | 1405.4  | 988.3   | 1016.5  | 1459.9  | 2057.4  | 2850.3  | 3455.3  | 3370.8  | 3098.4  |
| 80°   | 4206.9  | 2222.8  | 1099.2  | 802.3   | 826.7   | 1134.9  | 1687.3  | 2344.9  | 3181.0  | 3320.1  | 3203.6  |
| 82.5° | 1937.2  | 1390.4  | 824.8   | 644.5   | 653.9   | 826.7   | 1258.9  | 1736.1  | 2692.5  | 3047.6  | 3338.9  |
| 85°   | 1131.1  | 911.3   | 550.5   | 430.3   | 447.2   | 488.5   | 708.4   | 1059.7  | 1745.5  | 2324.2  | 2600.4  |
| 87.5° | 385.2   | 317.5   | 214.2   | 182.3   | 176.6   | 201.0   | 171.0   | 347.6   | 518.6   | 913.2   | 1042.8  |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |

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

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-3

Luminaire Tested: CST-CA6-230-757-U-T4

Test Date: 04/21/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/21/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA6-230-757-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 5385   | CRI (Ra): | 74.4 |      |       |
| CIE u':                   | 0.2065 | R1:       | 71.8 | R9:  | -25.2 |
| CIE v':                   | 0.4808 | R2:       | 79.4 | R10: | 50.6  |
| Duv:                      | 0.0018 | R3:       | 84.2 | R11: | 72.0  |
| CIE x:                    | 0.3351 | R4:       | 74.7 | R12: | 46.0  |
| CIE y:                    | 0.3467 | R5:       | 72.8 | R13: | 73.1  |
| CIE z:                    | 0.3182 | R6:       | 71.2 | R14: | 91.2  |
| Peak Wavelength (nm):     | 450    | R7:       | 82.2 |      |       |
| Dominant Wavelength (nm): | 560    | R8:       | 58.6 |      |       |
| Purity:                   | 4.7    |           |      |      |       |
| Rf:                       | 75.3   |           |      |      |       |
| Rg:                       | 94.2   |           |      |      |       |



### Test Conditions

Stabilization Time: 66M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/32%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2104-215-3

| 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: SP1-2104-215-3

**CIE 1931 Chromaticity Diagram**



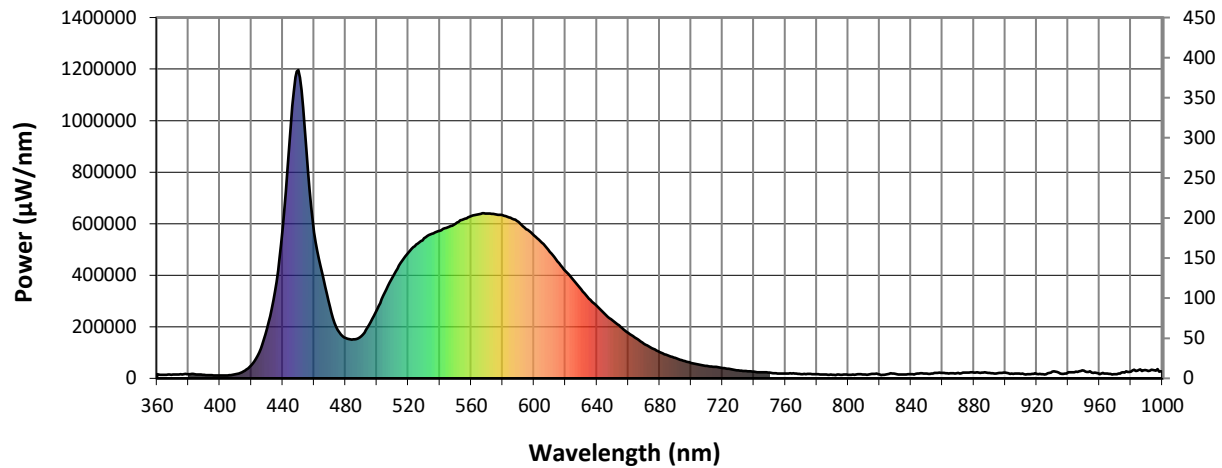
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 5700K 7-step quadrangle

REPORT NUMBER: SP1-2104-215-3

### 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       | 16696            | 0.0              | 490       | 164243           | 23.3             | 620       | 415797           | 108.2            | 750       | 22190            | 0.0              | 880       | 22866            | 0.0              |
| 365       | 13447            | 0.0              | 495       | 207773           | 37.7             | 625       | 382869           | 84.5             | 755       | 18942            | 0.0              | 885       | 21901            | 0.0              |
| 370       | 14521            | 0.0              | 500       | 267487           | 59.0             | 630       | 344785           | 62.4             | 760       | 18760            | 0.0              | 890       | 20912            | 0.0              |
| 375       | 15598            | 0.0              | 505       | 333279           | 93.2             | 635       | 309549           | 46.5             | 765       | 19375            | 0.0              | 895       | 19858            | 0.0              |
| 380       | 16553            | 0.0              | 510       | 393084           | 135.0            | 640       | 280226           | 33.5             | 770       | 16788            | 0.0              | 900       | 21828            | 0.0              |
| 385       | 15196            | 0.0              | 515       | 446481           | 185.0            | 645       | 249624           | 24.0             | 775       | 17302            | 0.0              | 905       | 17086            | 0.0              |
| 390       | 13481            | 0.0              | 520       | 488198           | 236.7            | 650       | 224464           | 16.4             | 780       | 15672            | 0.0              | 910       | 17542            | 0.0              |
| 395       | 11977            | 0.0              | 525       | 518433           | 278.3            | 655       | 199646           | 11.5             | 785       | 14771            | 0.0              | 915       | 16185            | 0.0              |
| 400       | 11331            | 0.0              | 530       | 543281           | 319.9            | 660       | 175926           | 7.3              | 790       | 13984            | 0.0              | 920       | 17995            | 0.0              |
| 405       | 11814            | 0.0              | 535       | 561190           | 348.0            | 665       | 155139           | 4.9              | 795       | 14040            | 0.0              | 925       | 15557            | 0.0              |
| 410       | 16208            | 0.0              | 540       | 572451           | 373.0            | 670       | 134630           | 2.9              | 800       | 13342            | 0.0              | 930       | 26095            | 0.0              |
| 415       | 26808            | 0.0              | 545       | 585457           | 389.7            | 675       | 117218           | 2.0              | 805       | 14668            | 0.0              | 935       | 19199            | 0.0              |
| 420       | 50871            | 0.1              | 550       | 599090           | 407.1            | 680       | 102027           | 1.2              | 810       | 14789            | 0.0              | 940       | 23080            | 0.0              |
| 425       | 101020           | 0.5              | 555       | 616995           | 421.4            | 685       | 89213            | 0.8              | 815       | 17650            | 0.0              | 945       | 26343            | 0.0              |
| 430       | 192411           | 1.5              | 560       | 629425           | 427.7            | 690       | 78917            | 0.4              | 820       | 14937            | 0.0              | 950       | 29934            | 0.0              |
| 435       | 336902           | 4.0              | 565       | 636833           | 423.4            | 695       | 68780            | 0.3              | 825       | 16011            | 0.0              | 955       | 22346            | 0.0              |
| 440       | 581105           | 9.1              | 570       | 639836           | 416.0            | 700       | 60229            | 0.2              | 830       | 16981            | 0.0              | 960       | 16017            | 0.0              |
| 445       | 974221           | 20.3             | 575       | 636704           | 396.2            | 705       | 53321            | 0.1              | 835       | 15554            | 0.0              | 965       | 18299            | 0.0              |
| 450       | 1195987          | 31.0             | 580       | 633339           | 376.3            | 710       | 47871            | 0.1              | 840       | 16030            | 0.0              | 970       | 16401            | 0.0              |
| 455       | 889289           | 29.8             | 585       | 623206           | 346.3            | 715       | 44671            | 0.0              | 845       | 19004            | 0.0              | 975       | 23481            | 0.0              |
| 460       | 566512           | 23.2             | 590       | 607134           | 313.9            | 720       | 40236            | 0.0              | 850       | 18632            | 0.0              | 980       | 26457            | 0.0              |
| 465       | 410582           | 21.2             | 595       | 578226           | 274.1            | 725       | 35616            | 0.0              | 855       | 21549            | 0.0              | 985       | 32065            | 0.0              |
| 470       | 276356           | 17.2             | 600       | 554348           | 238.9            | 730       | 31102            | 0.0              | 860       | 21257            | 0.0              | 990       | 31414            | 0.0              |
| 475       | 187504           | 14.7             | 605       | 526616           | 203.9            | 735       | 28341            | 0.0              | 865       | 20272            | 0.0              | 995       | 30650            | 0.0              |
| 480       | 156769           | 14.9             | 610       | 490933           | 168.7            | 740       | 25553            | 0.0              | 870       | 20808            | 0.0              | 1000      | 26490            | 0.0              |
| 485       | 151040           | 17.9             | 615       | 453646           | 136.9            | 745       | 23976            | 0.0              | 875       | 22729            | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 72376.6

S/P: 1.89

| 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       | 16696            | 0.0              | 490       | 164243           | 252.9            | 620       | 415797           | 5.2              | 750       | 22190            | 0.0              | 880       | 22866            | 0.0              |
| 365       | 13447            | 0.0              | 495       | 207773           | 335.9            | 625       | 382869           | 3.2              | 755       | 18942            | 0.0              | 885       | 21901            | 0.0              |
| 370       | 14521            | 0.0              | 500       | 267487           | 447.4            | 630       | 344785           | 2.0              | 760       | 18760            | 0.0              | 890       | 20912            | 0.0              |
| 375       | 15598            | 0.0              | 505       | 333279           | 566.6            | 635       | 309549           | 1.2              | 765       | 19375            | 0.0              | 895       | 19858            | 0.0              |
| 380       | 16553            | 0.0              | 510       | 393084           | 666.2            | 640       | 280226           | 0.7              | 770       | 16788            | 0.0              | 900       | 21828            | 0.0              |
| 385       | 15196            | 0.0              | 515       | 446481           | 740.0            | 645       | 249624           | 0.4              | 775       | 17302            | 0.0              | 905       | 17086            | 0.0              |
| 390       | 13481            | 0.1              | 520       | 488198           | 776.0            | 650       | 224464           | 0.3              | 780       | 15672            | 0.0              | 910       | 17542            | 0.0              |
| 395       | 11977            | 0.1              | 525       | 518433           | 775.6            | 655       | 199646           | 0.2              | 785       | 14771            | 0.0              | 915       | 16185            | 0.0              |
| 400       | 11331            | 0.2              | 530       | 543281           | 749.0            | 660       | 175926           | 0.1              | 790       | 13984            | 0.0              | 920       | 17995            | 0.0              |
| 405       | 11814            | 0.4              | 535       | 561190           | 699.3            | 665       | 155139           | 0.1              | 795       | 14040            | 0.0              | 925       | 15557            | 0.0              |
| 410       | 16208            | 1.0              | 540       | 572451           | 632.6            | 670       | 134630           | 0.0              | 800       | 13342            | 0.0              | 930       | 26095            | 0.0              |
| 415       | 26808            | 2.8              | 545       | 585457           | 561.3            | 675       | 117218           | 0.0              | 805       | 14668            | 0.0              | 935       | 19199            | 0.0              |
| 420       | 50871            | 8.4              | 550       | 599090           | 489.9            | 680       | 102027           | 0.0              | 810       | 14789            | 0.0              | 940       | 23080            | 0.0              |
| 425       | 101020           | 24.7             | 555       | 616995           | 421.7            | 685       | 89213            | 0.0              | 815       | 17650            | 0.0              | 945       | 26343            | 0.0              |
| 430       | 192411           | 65.5             | 560       | 629425           | 351.8            | 690       | 78917            | 0.0              | 820       | 14937            | 0.0              | 950       | 29934            | 0.0              |
| 435       | 336902           | 150.6            | 565       | 636833           | 285.7            | 695       | 68780            | 0.0              | 825       | 16011            | 0.0              | 955       | 22346            | 0.0              |
| 440       | 581105           | 324.8            | 570       | 639836           | 225.8            | 700       | 60229            | 0.0              | 830       | 16981            | 0.0              | 960       | 16017            | 0.0              |
| 445       | 974221           | 652.3            | 575       | 636704           | 173.4            | 705       | 53321            | 0.0              | 835       | 15554            | 0.0              | 965       | 18299            | 0.0              |
| 450       | 1195987          | 927.0            | 580       | 633339           | 130.5            | 710       | 47871            | 0.0              | 840       | 16030            | 0.0              | 970       | 16401            | 0.0              |
| 455       | 889289           | 777.1            | 585       | 623206           | 95.2             | 715       | 44671            | 0.0              | 845       | 19004            | 0.0              | 975       | 23481            | 0.0              |
| 460       | 566512           | 547.2            | 590       | 607134           | 67.6             | 720       | 40236            | 0.0              | 850       | 18632            | 0.0              | 980       | 26457            | 0.0              |
| 465       | 410582           | 433.6            | 595       | 578226           | 46.1             | 725       | 35616            | 0.0              | 855       | 21549            | 0.0              | 985       | 32065            | 0.0              |
| 470       | 276356           | 318.2            | 600       | 554348           | 31.2             | 730       | 31102            | 0.0              | 860       | 21257            | 0.0              | 990       | 31414            | 0.0              |
| 475       | 187504           | 234.4            | 605       | 526616           | 20.7             | 735       | 28341            | 0.0              | 865       | 20272            | 0.0              | 995       | 30650            | 0.0              |
| 480       | 156769           | 211.8            | 610       | 490933           | 13.3             | 740       | 25553            | 0.0              | 870       | 20808            | 0.0              | 1000      | 26490            | 0.0              |
| 485       | 151040           | 218.9            | 615       | 453646           | 8.4              | 745       | 23976            | 0.0              | 875       | 22729            | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 29860.2**      **M/P: 0.78**

| 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       | 16696            | 0.0              | 490       | 164243           | 136.7            | 620       | 415797           | 0.3              | 750       | 22190            | 0.0              | 880       | 22866            | 0.0              |
| 365       | 13447            | 0.0              | 495       | 207773           | 171.5            | 625       | 382869           | 0.2              | 755       | 18942            | 0.0              | 885       | 21901            | 0.0              |
| 370       | 14521            | 0.0              | 500       | 267487           | 215.0            | 630       | 344785           | 0.1              | 760       | 18760            | 0.0              | 890       | 20912            | 0.0              |
| 375       | 15598            | 0.0              | 505       | 333279           | 255.8            | 635       | 309549           | 0.1              | 765       | 19375            | 0.0              | 895       | 19858            | 0.0              |
| 380       | 16553            | 0.0              | 510       | 393084           | 282.2            | 640       | 280226           | 0.0              | 770       | 16788            | 0.0              | 900       | 21828            | 0.0              |
| 385       | 15196            | 0.0              | 515       | 446481           | 291.7            | 645       | 249624           | 0.0              | 775       | 17302            | 0.0              | 905       | 17086            | 0.0              |
| 390       | 13481            | 0.0              | 520       | 488198           | 284.2            | 650       | 224464           | 0.0              | 780       | 15672            | 0.0              | 910       | 17542            | 0.0              |
| 395       | 11977            | 0.1              | 525       | 518433           | 262.9            | 655       | 199646           | 0.0              | 785       | 14771            | 0.0              | 915       | 16185            | 0.0              |
| 400       | 11331            | 0.1              | 530       | 543281           | 234.8            | 660       | 175926           | 0.0              | 790       | 13984            | 0.0              | 920       | 17995            | 0.0              |
| 405       | 11814            | 0.2              | 535       | 561190           | 202.0            | 665       | 155139           | 0.0              | 795       | 14040            | 0.0              | 925       | 15557            | 0.0              |
| 410       | 16208            | 0.6              | 540       | 572451           | 167.5            | 670       | 134630           | 0.0              | 800       | 13342            | 0.0              | 930       | 26095            | 0.0              |
| 415       | 26808            | 1.8              | 545       | 585457           | 136.0            | 675       | 117218           | 0.0              | 805       | 14668            | 0.0              | 935       | 19199            | 0.0              |
| 420       | 50871            | 5.8              | 550       | 599090           | 107.5            | 680       | 102027           | 0.0              | 810       | 14789            | 0.0              | 940       | 23080            | 0.0              |
| 425       | 101020           | 15.7             | 555       | 616995           | 83.2             | 685       | 89213            | 0.0              | 815       | 17650            | 0.0              | 945       | 26343            | 0.0              |
| 430       | 192411           | 40.6             | 560       | 629425           | 62.1             | 690       | 78917            | 0.0              | 820       | 14937            | 0.0              | 950       | 29934            | 0.0              |
| 435       | 336902           | 89.9             | 565       | 636833           | 44.7             | 695       | 68780            | 0.0              | 825       | 16011            | 0.0              | 955       | 22346            | 0.0              |
| 440       | 581105           | 194.2            | 570       | 639836           | 31.3             | 700       | 60229            | 0.0              | 830       | 16981            | 0.0              | 960       | 16017            | 0.0              |
| 445       | 974221           | 384.3            | 575       | 636704           | 21.2             | 705       | 53321            | 0.0              | 835       | 15554            | 0.0              | 965       | 18299            | 0.0              |
| 450       | 1195987          | 551.1            | 580       | 633339           | 14.2             | 710       | 47871            | 0.0              | 840       | 16030            | 0.0              | 970       | 16401            | 0.0              |
| 455       | 889289           | 465.9            | 585       | 623206           | 9.3              | 715       | 44671            | 0.0              | 845       | 19004            | 0.0              | 975       | 23481            | 0.0              |
| 460       | 566512           | 333.8            | 590       | 607134           | 6.0              | 720       | 40236            | 0.0              | 850       | 18632            | 0.0              | 980       | 26457            | 0.0              |
| 465       | 410582           | 268.3            | 595       | 578226           | 3.7              | 725       | 35616            | 0.0              | 855       | 21549            | 0.0              | 985       | 32065            | 0.0              |
| 470       | 276356           | 197.8            | 600       | 554348           | 2.3              | 730       | 31102            | 0.0              | 860       | 21257            | 0.0              | 990       | 31414            | 0.0              |
| 475       | 187504           | 143.2            | 605       | 526616           | 1.5              | 735       | 28341            | 0.0              | 865       | 20272            | 0.0              | 995       | 30650            | 0.0              |
| 480       | 156769           | 126.0            | 610       | 490933           | 0.9              | 740       | 25553            | 0.0              | 870       | 20808            | 0.0              | 1000      | 26490            | 0.0              |
| 485       | 151040           | 124.5            | 615       | 453646           | 0.5              | 745       | 23976            | 0.0              | 875       | 22729            | 0.0              |           |                  |                  |

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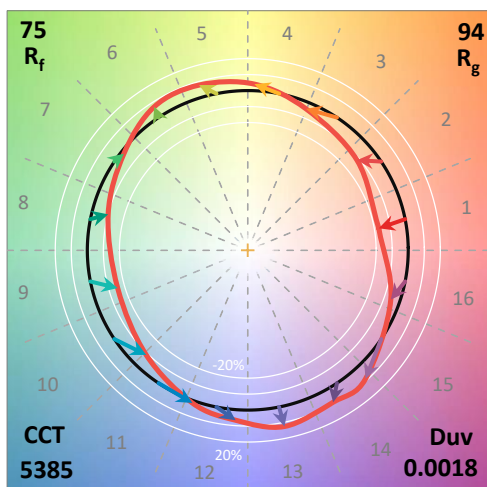
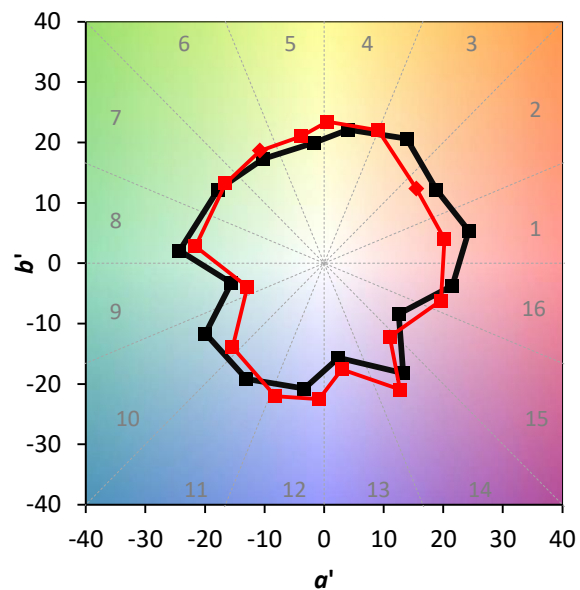
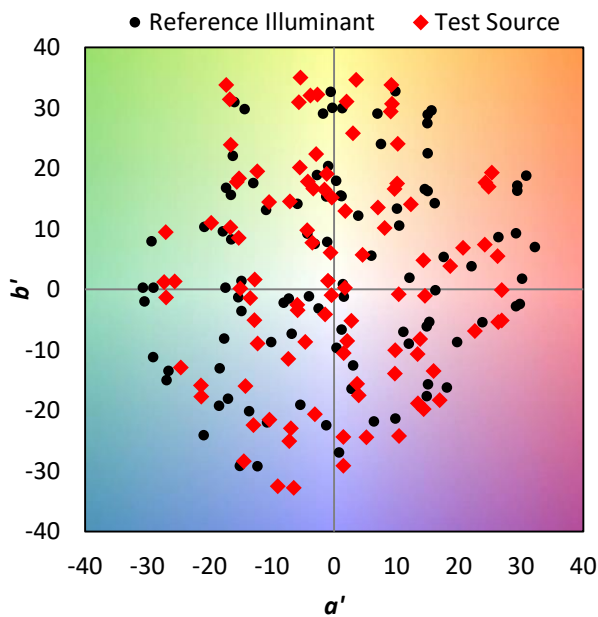
TM-30-18

### Summary

$R_f = 75.3$   
 $R_g = 94.2$   
 CIE  $R_a = 74.4$   
 $R_g = -25.2$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 64 | CES51 = 91 | CES76 = 51 |
| CES02 = 59 | CES27 = 89 | CES52 = 91 | CES77 = 67 |
| CES03 = 30 | CES28 = 81 | CES53 = 81 | CES78 = 53 |
| CES04 = 69 | CES29 = 69 | CES54 = 86 | CES79 = 80 |
| CES05 = 46 | CES30 = 87 | CES55 = 84 | CES80 = 76 |
| CES06 = 50 | CES31 = 72 | CES56 = 76 | CES81 = 79 |
| CES07 = 38 | CES32 = 63 | CES57 = 76 | CES82 = 90 |
| CES08 = 38 | CES33 = 81 | CES58 = 76 | CES83 = 89 |
| CES09 = 29 | CES34 = 70 | CES59 = 87 | CES84 = 85 |
| CES10 = 72 | CES35 = 83 | CES60 = 89 | CES85 = 78 |
| CES11 = 55 | CES36 = 88 | CES61 = 83 | CES86 = 78 |
| CES12 = 61 | CES37 = 78 | CES62 = 83 | CES87 = 77 |
| CES13 = 41 | CES38 = 97 | CES63 = 76 | CES88 = 82 |
| CES14 = 74 | CES39 = 96 | CES64 = 67 | CES89 = 75 |
| CES15 = 70 | CES40 = 91 | CES65 = 64 | CES90 = 82 |
| CES16 = 46 | CES41 = 96 | CES66 = 60 | CES91 = 72 |
| CES17 = 48 | CES42 = 79 | CES67 = 57 | CES92 = 62 |
| CES18 = 55 | CES43 = 78 | CES68 = 65 | CES93 = 77 |
| CES19 = 71 | CES44 = 99 | CES69 = 73 | CES94 = 57 |
| CES20 = 64 | CES45 = 87 | CES70 = 57 | CES95 = 66 |
| CES21 = 85 | CES46 = 86 | CES71 = 49 | CES96 = 78 |
| CES22 = 77 | CES47 = 89 | CES72 = 83 | CES97 = 87 |
| CES23 = 91 | CES48 = 82 | CES73 = 47 | CES98 = 78 |
| CES24 = 90 | CES49 = 84 | CES74 = 90 | CES99 = 65 |
| CES25 = 71 | CES50 = 91 | CES75 = 51 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)