

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: P510750

Luminaire Tested: **CTN-CA8-230-760-U-T4-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510750  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-17)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: CTN-CA8-230-760-U-T4-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (8) 5700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 31617 lumens  
Efficiency: N/A  
Efficacy: 138.4 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

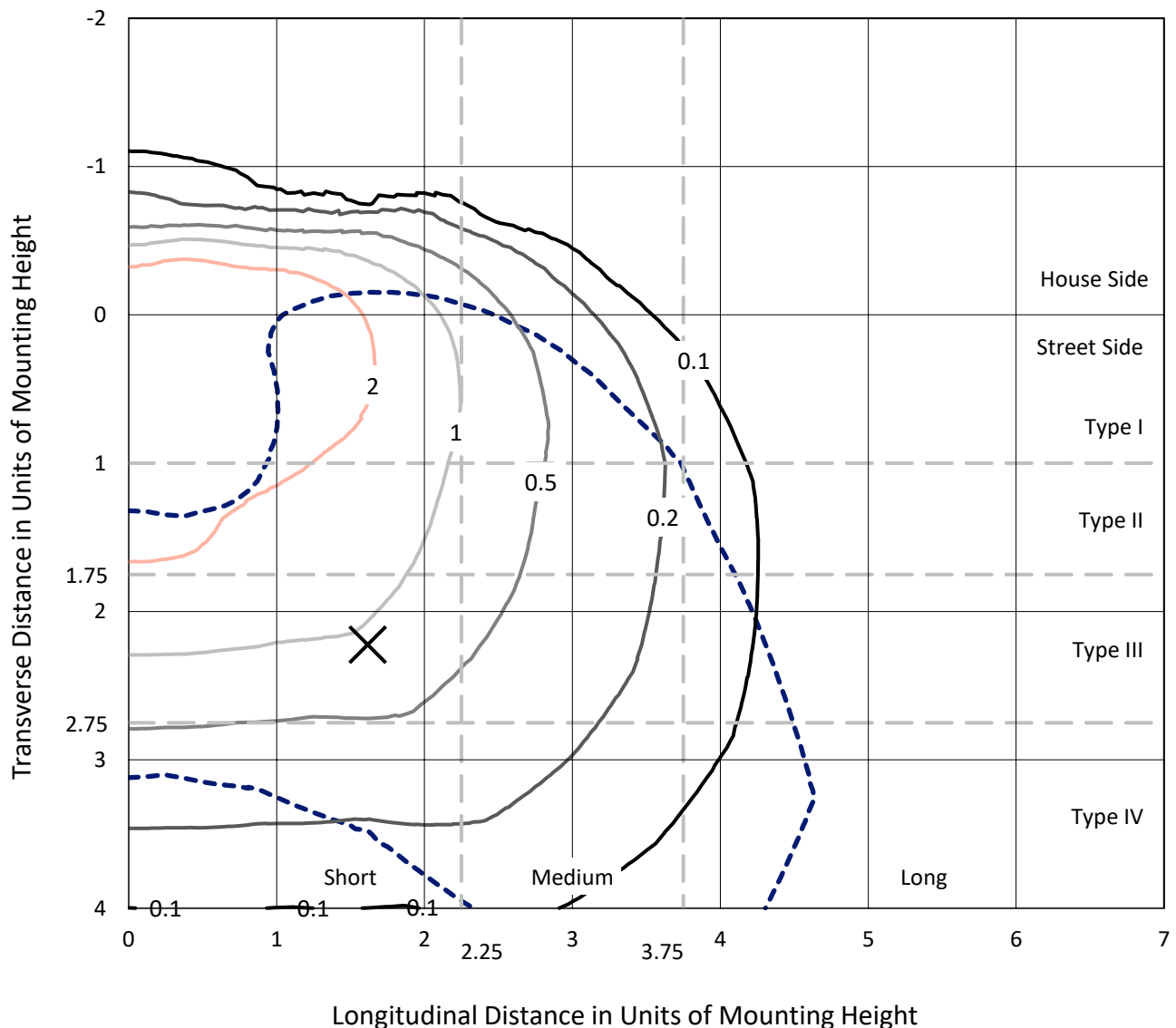
Input Watts (W): 228.4  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

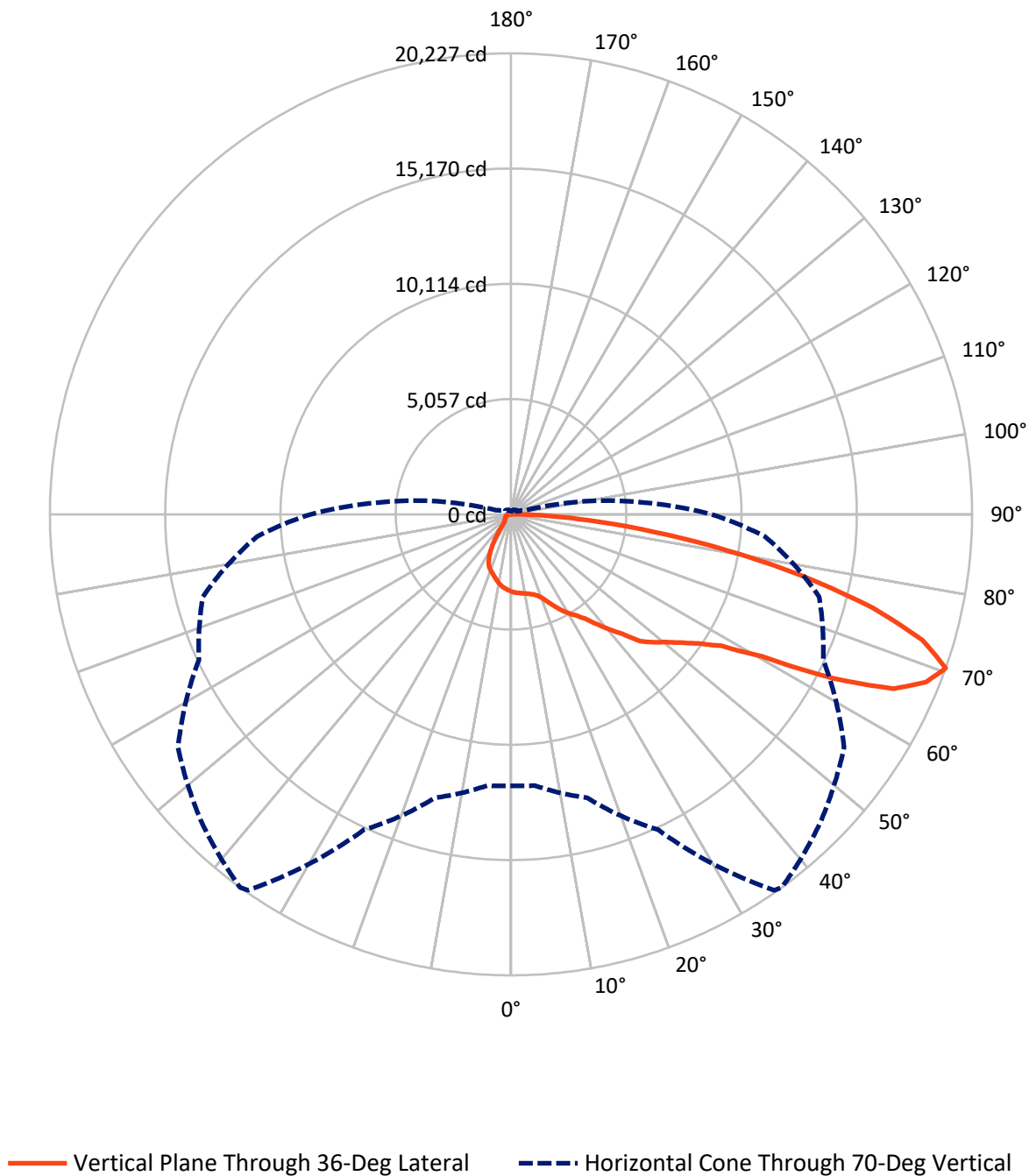
✕ Max cd  
 - - - 1/2 Max cd



Based on 30 foot mounting height. Maximum calculated value = 4.3 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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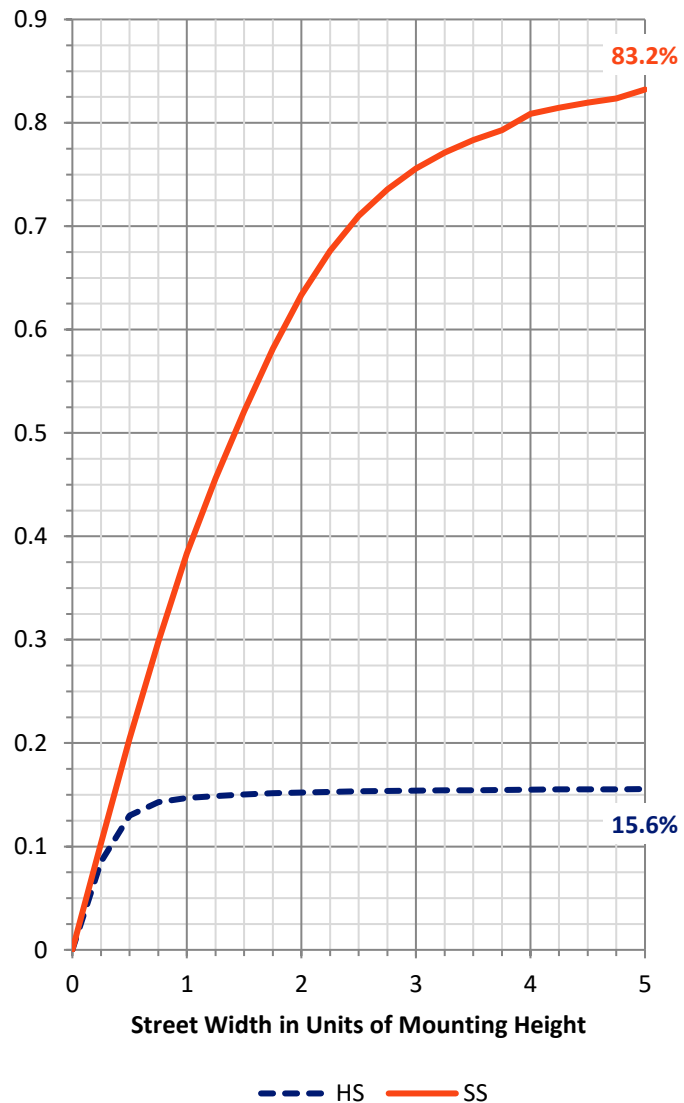
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 4989.4   | 0.0    | 4989.4  |
|                    | % Fixture | 15.8     | 0.0    | 15.8    |
| <b>Street Side</b> | Lumens    | 26627.6  | 0.0    | 26627.6 |
|                    | % Fixture | 84.2     | 0.0    | 84.2    |
| <b>Total</b>       | Lumens    | 31617.0  | 0.0    | 31617.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 321.3   | 1.0       |
| 10°-20°   | 955.4   | 3.0       |
| 20°-30°   | 1718.2  | 5.4       |
| 30°-40°   | 2718.9  | 8.6       |
| 40°-50°   | 4249.2  | 13.4      |
| 50°-60°   | 6101.8  | 19.3      |
| 60°-70°   | 8276.5  | 26.2      |
| 70°-80°   | 6125.5  | 19.4      |
| 80°-90°   | 1150.2  | 3.6       |
| 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°    | 31617.0 | 100.0     |
| 0°-180°   | 31617.0 | 100.0     |

**Coefficient of Utilization**



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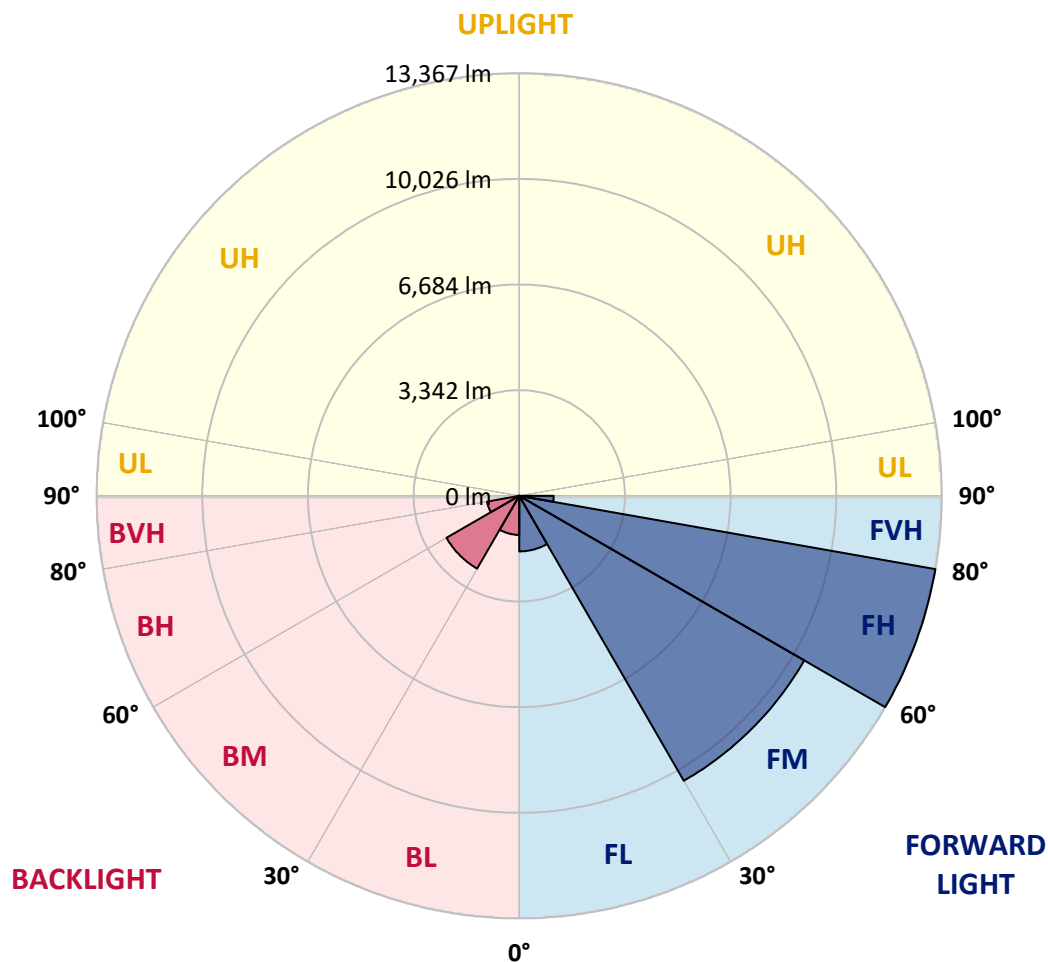
CATALOG NUMBER: CTN-CA8-230-760-U-T4-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1758.5  | 5.6       |                         |      |         |
| FM   | (30°-60°)   | 10411.2 | 32.9      |                         |      |         |
| FH   | (60°-80°)   | 13367.4 | 42.3      |                         |      | G5      |
| FVH  | (80°-90°)   | 1090.5  | 3.4       |                         |      | G5      |
| BL   | (0°-30°)    | 1236.3  | 3.9       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 2658.7  | 8.4       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 1034.7  | 3.3       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 59.7    | 0.2       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G5**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 36°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 3387.6  | 3387.6  | 3387.6  | 3387.6  | 3387.6  | 3387.6  | 3387.6  | 3387.6  | 3387.6  | 3387.6  | 3387.6  |
| 2.5°  | 3456.2  | 3448.9  | 3443.1  | 3445.3  | 3440.9  | 3443.8  | 3437.2  | 3429.2  | 3410.2  | 3402.2  | 3398.6  |
| 5°    | 3486.9  | 3484.7  | 3478.8  | 3474.5  | 3466.4  | 3463.5  | 3456.2  | 3462.8  | 3452.6  | 3426.3  | 3411.0  |
| 7.5°  | 3505.1  | 3504.4  | 3497.8  | 3488.3  | 3492.7  | 3496.4  | 3503.7  | 3493.4  | 3480.3  | 3467.9  | 3436.5  |
| 10°   | 3513.2  | 3513.2  | 3505.1  | 3510.2  | 3532.9  | 3535.0  | 3538.7  | 3545.3  | 3532.9  | 3514.6  | 3483.2  |
| 12.5° | 3533.6  | 3532.1  | 3535.0  | 3551.8  | 3575.2  | 3580.3  | 3598.6  | 3598.6  | 3600.0  | 3589.1  | 3552.6  |
| 15°   | 3584.7  | 3584.7  | 3591.3  | 3606.6  | 3646.7  | 3649.6  | 3676.7  | 3700.7  | 3703.7  | 3687.6  | 3659.9  |
| 17.5° | 3702.9  | 3700.0  | 3696.4  | 3705.9  | 3748.9  | 3750.4  | 3797.1  | 3827.8  | 3835.8  | 3853.3  | 3848.9  |
| 20°   | 3927.8  | 3924.8  | 3924.1  | 3924.8  | 3921.9  | 3917.5  | 3963.5  | 3996.4  | 4037.2  | 4067.9  | 4083.2  |
| 22.5° | 4249.7  | 4243.1  | 4243.1  | 4207.3  | 4179.6  | 4184.0  | 4191.3  | 4209.5  | 4263.5  | 4317.5  | 4375.2  |
| 25°   | 4596.4  | 4592.0  | 4595.6  | 4504.4  | 4467.2  | 4481.8  | 4472.3  | 4500.7  | 4571.6  | 4618.3  | 4679.6  |
| 27.5° | 4879.6  | 4886.1  | 4865.7  | 4794.9  | 4770.8  | 4781.8  | 4759.9  | 4841.6  | 4919.7  | 5001.5  | 5094.2  |
| 30°   | 5232.1  | 5197.1  | 5146.7  | 5060.6  | 5051.8  | 5053.3  | 5051.8  | 5183.2  | 5345.3  | 5462.1  | 5590.5  |
| 32.5° | 5692.7  | 5698.6  | 5585.4  | 5382.5  | 5308.0  | 5297.8  | 5327.0  | 5519.7  | 5738.7  | 5997.8  | 6167.2  |
| 35°   | 6158.4  | 6167.9  | 6085.4  | 5873.7  | 5661.3  | 5629.2  | 5586.2  | 5836.5  | 6152.6  | 6672.3  | 6927.8  |
| 37.5° | 6652.6  | 6686.2  | 6588.3  | 6399.3  | 6147.5  | 6117.5  | 5913.9  | 6159.9  | 6627.0  | 7470.8  | 7805.9  |
| 40°   | 7313.9  | 7278.1  | 7159.9  | 6919.7  | 6685.4  | 6637.3  | 6400.8  | 6530.0  | 7237.3  | 8470.8  | 8713.9  |
| 42.5° | 7801.5  | 7791.3  | 7691.3  | 7454.0  | 7218.3  | 7179.6  | 6989.1  | 7129.2  | 8005.9  | 9484.7  | 9593.5  |
| 45°   | 8188.4  | 8251.1  | 8248.9  | 8100.0  | 7967.2  | 7945.3  | 7832.9  | 8039.4  | 8935.1  | 10441.6 | 10388.4 |
| 47.5° | 8532.1  | 8570.8  | 8508.8  | 8443.8  | 8381.8  | 8389.1  | 8472.3  | 8897.1  | 9884.7  | 11277.4 | 11041.6 |
| 50°   | 9094.9  | 9045.3  | 8767.2  | 8717.6  | 8805.1  | 8808.8  | 9062.1  | 9716.1  | 10930.7 | 12000.0 | 11594.9 |
| 52.5° | 9845.3  | 9791.3  | 9219.7  | 9135.1  | 9342.4  | 9357.7  | 9778.9  | 10532.2 | 12009.5 | 12690.6 | 12145.3 |
| 55°   | 10962.1 | 10836.5 | 10224.1 | 9844.6  | 9939.5  | 10001.5 | 10511.7 | 11316.8 | 12854.1 | 13299.3 | 12562.1 |
| 57.5° | 12333.6 | 12424.9 | 12111.0 | 11253.3 | 10858.4 | 10881.8 | 11350.4 | 12067.9 | 13599.3 | 13832.2 | 12805.9 |
| 60°   | 13783.3 | 13761.4 | 13892.8 | 13531.4 | 12775.2 | 12649.7 | 12411.0 | 12834.4 | 14176.7 | 14281.1 | 13057.0 |
| 62.5° | 14577.4 | 14705.2 | 15143.1 | 15215.4 | 15897.9 | 15831.4 | 14204.4 | 13784.7 | 14843.9 | 14562.8 | 13125.6 |
| 65°   | 14573.0 | 14628.5 | 15443.9 | 16340.2 | 18472.3 | 18453.4 | 17697.1 | 15159.2 | 15340.9 | 14713.2 | 12988.4 |
| 67.5° | 13631.4 | 13717.6 | 14670.9 | 16422.0 | 19662.1 | 19639.5 | 19116.9 | 17091.3 | 15497.1 | 14532.2 | 12348.2 |
| 70°   | 11914.6 | 11943.8 | 12873.8 | 15270.9 | 20140.2 | 20227.1 | 19165.8 | 17832.9 | 15108.8 | 13994.2 | 11181.1 |
| 72.5° | 9829.2  | 9768.6  | 10678.1 | 13040.9 | 18922.7 | 18870.9 | 18355.5 | 16947.5 | 14454.8 | 12949.7 | 9119.0  |
| 75°   | 7237.3  | 7405.9  | 8221.9  | 10470.8 | 16201.5 | 16391.3 | 16619.8 | 15592.8 | 12838.0 | 10672.3 | 6305.9  |
| 77.5° | 4778.9  | 4993.4  | 5818.3  | 7851.1  | 12826.3 | 13121.2 | 13713.2 | 13262.1 | 10443.8 | 7655.5  | 3002.9  |
| 80°   | 2469.4  | 2631.4  | 3373.7  | 5209.5  | 9194.9  | 9620.5  | 10705.9 | 10044.6 | 7404.4  | 3461.3  | 672.3   |
| 82.5° | 934.3   | 913.1   | 1511.7  | 2981.8  | 5895.6  | 6282.5  | 7071.6  | 6023.4  | 2635.0  | 608.0   | 312.4   |
| 85°   | 410.2   | 434.3   | 626.3   | 1359.9  | 3370.8  | 3421.2  | 4005.9  | 2348.2  | 386.1   | 290.5   | 212.4   |
| 87.5° | 177.4   | 203.7   | 262.8   | 391.2   | 1137.2  | 1313.1  | 1624.8  | 746.0   | 116.8   | 100.7   | 106.6   |
| 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: P510750

CATALOG NUMBER: CTN-CA8-230-760-U-T4-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3387.6  | 3387.6  | 3387.6 | 3387.6 | 3387.6 | 3387.6 | 3387.6 | 3387.6 | 3387.6 | 3387.6 | 3387.6 |
| 2.5°  | 3392.0  | 3387.6  | 3380.3 | 3362.1 | 3332.1 | 3328.5 | 3325.6 | 3322.6 | 3316.8 | 3319.7 | 3336.5 |
| 5°    | 3399.3  | 3391.3  | 3365.0 | 3338.7 | 3312.4 | 3289.1 | 3260.6 | 3249.6 | 3235.0 | 3225.6 | 3243.1 |
| 7.5°  | 3424.1  | 3407.3  | 3368.6 | 3332.9 | 3261.3 | 3227.0 | 3190.5 | 3147.5 | 3116.8 | 3097.1 | 3114.6 |
| 10°   | 3465.7  | 3444.5  | 3396.4 | 3322.6 | 3238.7 | 3144.5 | 3080.3 | 3008.8 | 2950.4 | 2934.3 | 2950.4 |
| 12.5° | 3533.6  | 3502.2  | 3446.0 | 3346.0 | 3197.1 | 3073.7 | 2951.8 | 2857.7 | 2763.5 | 2736.5 | 2744.5 |
| 15°   | 3643.8  | 3619.0  | 3532.9 | 3394.9 | 3197.8 | 3009.5 | 2828.5 | 2676.7 | 2553.3 | 2510.2 | 2507.3 |
| 17.5° | 3820.5  | 3794.2  | 3694.9 | 3492.0 | 3224.1 | 2959.1 | 2707.3 | 2475.9 | 2289.1 | 2194.2 | 2178.8 |
| 20°   | 4073.7  | 4037.2  | 3886.9 | 3635.1 | 3281.0 | 2937.2 | 2594.9 | 2284.0 | 1993.4 | 1815.3 | 1788.3 |
| 22.5° | 4355.5  | 4316.8  | 4094.9 | 3745.3 | 3321.9 | 2894.2 | 2487.6 | 2071.5 | 1689.1 | 1471.5 | 1440.9 |
| 25°   | 4705.9  | 4621.2  | 4294.2 | 3849.6 | 3312.4 | 2803.7 | 2313.1 | 1783.2 | 1368.6 | 1180.3 | 1159.9 |
| 27.5° | 5051.8  | 4944.5  | 4497.1 | 3904.4 | 3270.8 | 2659.9 | 2057.7 | 1446.0 | 1071.5 | 938.0  | 921.2  |
| 30°   | 5481.0  | 5273.7  | 4677.4 | 3929.9 | 3165.7 | 2444.5 | 1715.3 | 1099.3 | 802.2  | 710.2  | 694.2  |
| 32.5° | 5991.3  | 5677.4  | 4846.7 | 3901.5 | 2990.5 | 2116.1 | 1333.6 | 805.1  | 596.4  | 538.7  | 538.0  |
| 35°   | 6664.3  | 6172.3  | 5032.9 | 3808.0 | 2721.9 | 1762.1 | 935.0  | 550.4  | 465.0  | 445.3  | 448.9  |
| 37.5° | 7451.1  | 6842.4  | 5221.9 | 3654.8 | 2418.3 | 1348.2 | 623.4  | 424.1  | 408.8  | 409.5  | 410.2  |
| 40°   | 8281.1  | 7582.5  | 5476.7 | 3439.4 | 2049.6 | 975.9  | 448.9  | 381.0  | 380.3  | 387.6  | 389.8  |
| 42.5° | 9073.8  | 8301.5  | 5790.5 | 3152.6 | 1663.5 | 645.3  | 389.1  | 363.5  | 354.0  | 356.9  | 359.1  |
| 45°   | 9810.3  | 8918.3  | 6057.7 | 2873.0 | 1249.6 | 460.6  | 381.8  | 343.1  | 328.5  | 327.0  | 328.5  |
| 47.5° | 10403.7 | 9412.4  | 6220.5 | 2544.5 | 890.5  | 382.5  | 366.4  | 324.1  | 303.7  | 299.3  | 297.1  |
| 50°   | 10855.5 | 9779.6  | 6279.6 | 2172.3 | 602.2  | 365.0  | 346.0  | 302.2  | 277.4  | 278.1  | 278.1  |
| 52.5° | 11296.4 | 10113.2 | 6211.0 | 1797.1 | 443.1  | 349.6  | 332.1  | 284.7  | 258.4  | 272.3  | 275.9  |
| 55°   | 11613.9 | 10253.3 | 6011.0 | 1391.2 | 369.3  | 330.7  | 316.8  | 264.2  | 246.0  | 268.6  | 275.9  |
| 57.5° | 11799.3 | 10363.5 | 5643.8 | 1004.4 | 338.7  | 312.4  | 297.1  | 245.3  | 228.5  | 234.3  | 238.0  |
| 60°   | 11914.6 | 10209.5 | 5158.4 | 686.9  | 322.6  | 297.8  | 277.4  | 232.8  | 210.2  | 196.4  | 194.2  |
| 62.5° | 11851.1 | 9824.1  | 4519.0 | 472.3  | 305.8  | 281.8  | 260.6  | 221.2  | 191.2  | 173.0  | 171.5  |
| 65°   | 11333.6 | 9111.0  | 3469.4 | 382.5  | 295.6  | 274.5  | 250.4  | 210.2  | 178.1  | 160.6  | 158.4  |
| 67.5° | 10373.8 | 7829.2  | 2026.3 | 340.1  | 291.2  | 267.2  | 242.3  | 200.0  | 170.8  | 151.8  | 148.9  |
| 70°   | 8796.4  | 5889.1  | 678.8  | 303.7  | 290.5  | 266.4  | 235.8  | 192.7  | 162.8  | 143.1  | 140.1  |
| 72.5° | 6346.0  | 3553.3  | 330.7  | 267.2  | 271.5  | 255.5  | 230.7  | 186.9  | 157.7  | 132.8  | 127.7  |
| 75°   | 3606.6  | 1156.9  | 298.5  | 230.7  | 252.6  | 243.8  | 227.7  | 187.6  | 159.9  | 120.4  | 114.6  |
| 77.5° | 1026.3  | 338.0   | 288.3  | 196.4  | 238.7  | 251.8  | 213.1  | 169.3  | 163.5  | 111.7  | 104.4  |
| 80°   | 346.7   | 300.7   | 278.1  | 152.6  | 192.7  | 208.0  | 184.7  | 148.9  | 165.0  | 101.5  | 94.2   |
| 82.5° | 278.1   | 302.2   | 233.6  | 121.9  | 146.7  | 157.7  | 146.7  | 133.6  | 133.6  | 90.5   | 84.7   |
| 85°   | 222.6   | 280.3   | 148.2  | 97.1   | 109.5  | 121.2  | 103.7  | 100.0  | 93.4   | 75.9   | 73.7   |
| 87.5° | 129.2   | 87.6    | 61.3   | 49.6   | 46.0   | 46.7   | 40.1   | 48.2   | 59.1   | 51.8   | 51.1   |
| 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

### Photopic Flux vs. Wavelength



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| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 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              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-3

### 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              |           |                  |                  |

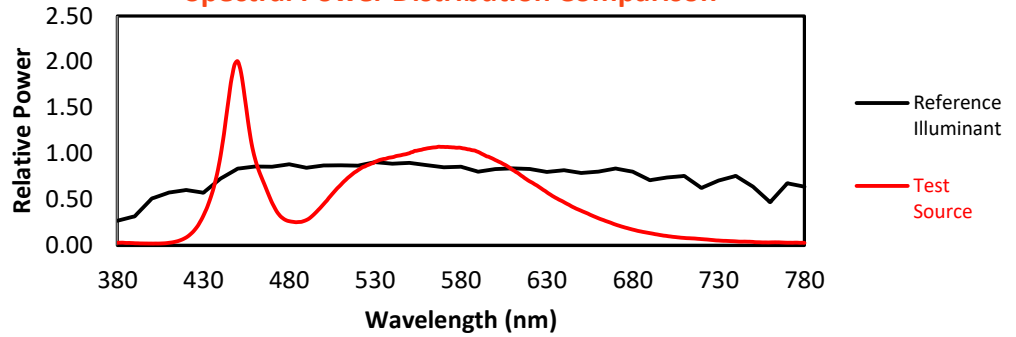
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TM-30-18

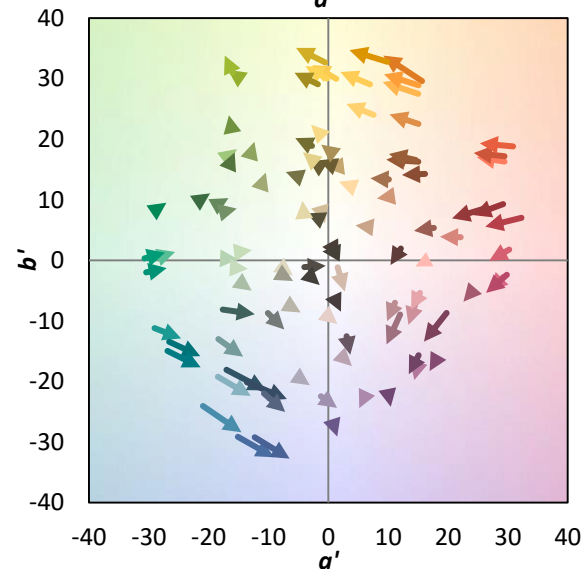
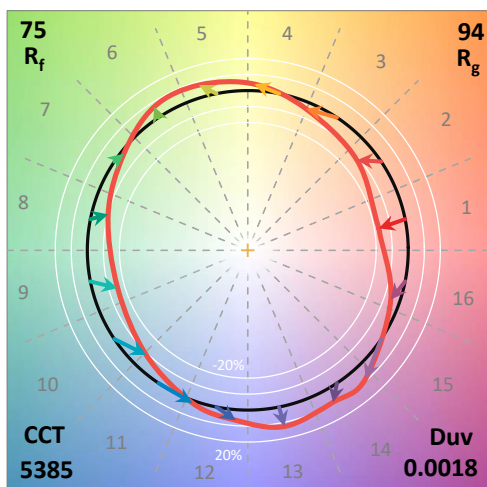
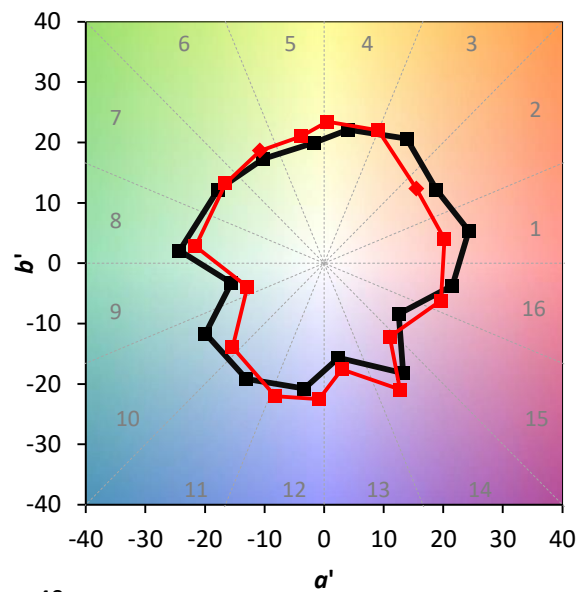
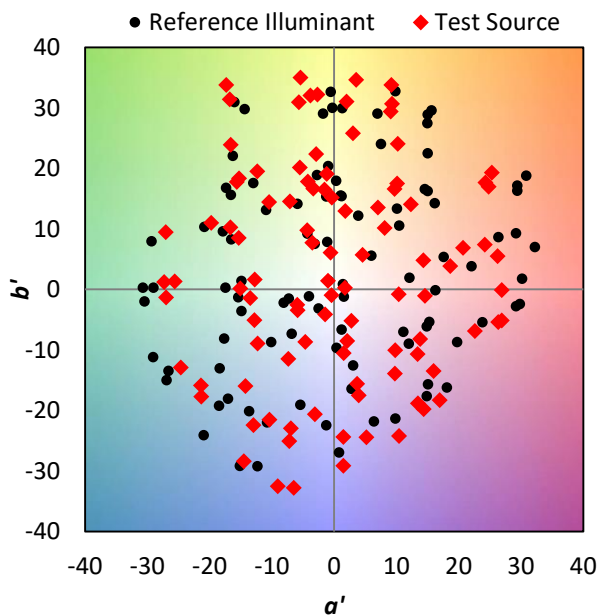
### Summary

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

### Spectral Power Distribution Comparison



### 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)