

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: P510650

Luminaire Tested: **CST-CA6-230-727-U-T4-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510650  
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: STREETWORKS  
Catalog Number: CST-CA6-230-727-U-T4-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (6) 2700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 25818 lumens  
Efficiency: N/A  
Efficacy: 113.3 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

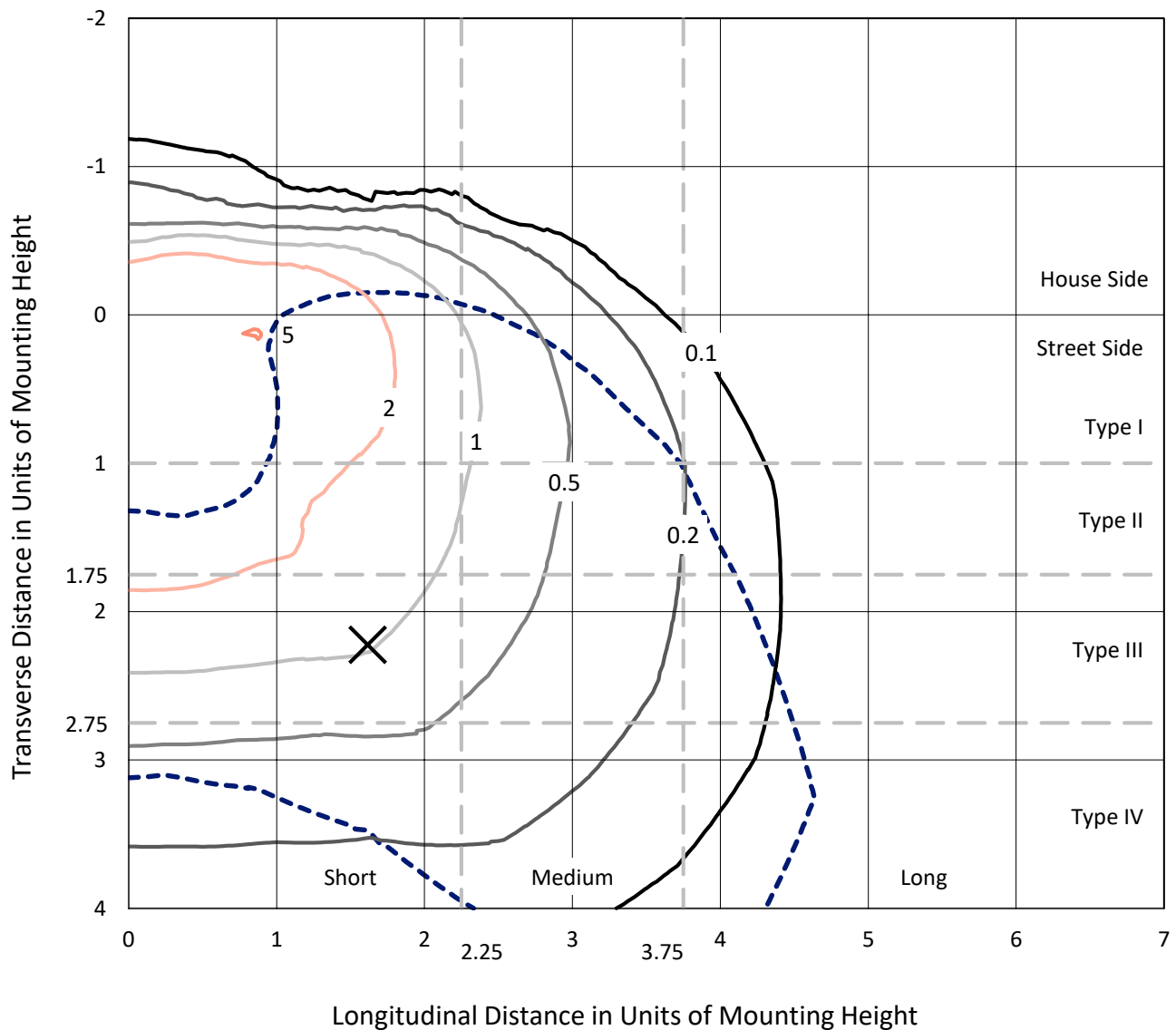
Input Watts (W): 227.8  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P510650  
 CATALOG NUMBER: CST-CA6-230-727-U-T4-HSS

## Iso-Footcandle Lines of Horizontal Illumination

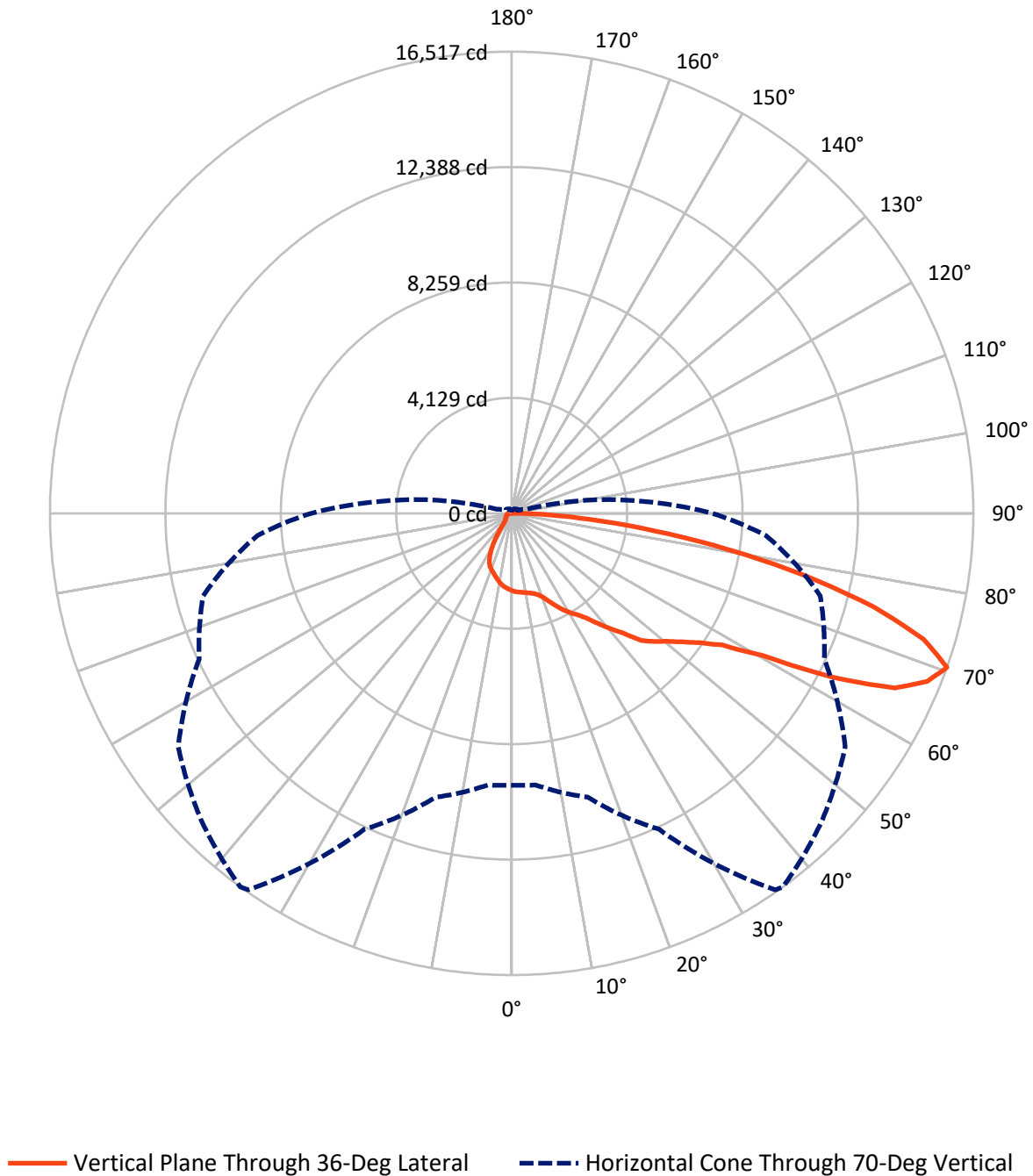
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 5 fc  
 Type IV - Short - N/A

REPORT NUMBER: P510650  
CATALOG NUMBER: CST-CA6-230-727-U-T4-HSS

## Luminous Intensity Polar Plot



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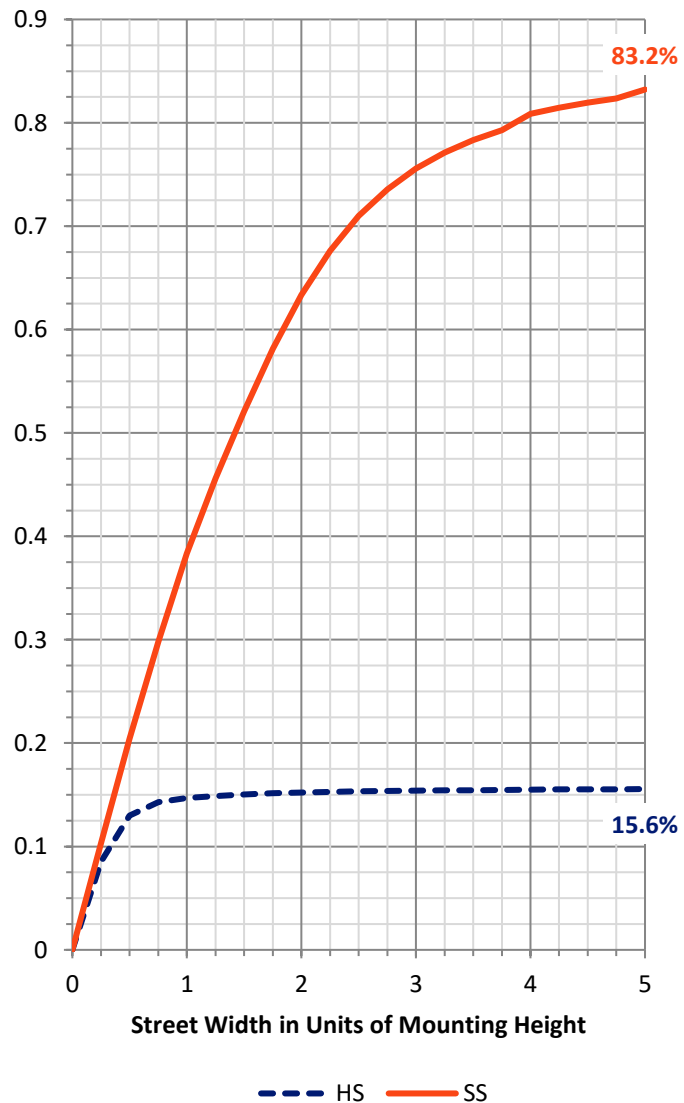
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 4074.3   | 0.0    | 4074.3  |
|                    | % Fixture | 15.8     | 0.0    | 15.8    |
| <b>Street Side</b> | Lumens    | 21743.7  | 0.0    | 21743.7 |
|                    | % Fixture | 84.2     | 0.0    | 84.2    |
| <b>Total</b>       | Lumens    | 25818.0  | 0.0    | 25818.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 262.4   | 1.0       |
| 10°-20°   | 780.2   | 3.0       |
| 20°-30°   | 1403.0  | 5.4       |
| 30°-40°   | 2220.2  | 8.6       |
| 40°-50°   | 3469.8  | 13.4      |
| 50°-60°   | 4982.6  | 19.3      |
| 60°-70°   | 6758.5  | 26.2      |
| 70°-80°   | 5002.0  | 19.4      |
| 80°-90°   | 939.2   | 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°    | 25818.0 | 100.0     |
| 0°-180°   | 25818.0 | 100.0     |

**Coefficient of Utilization**



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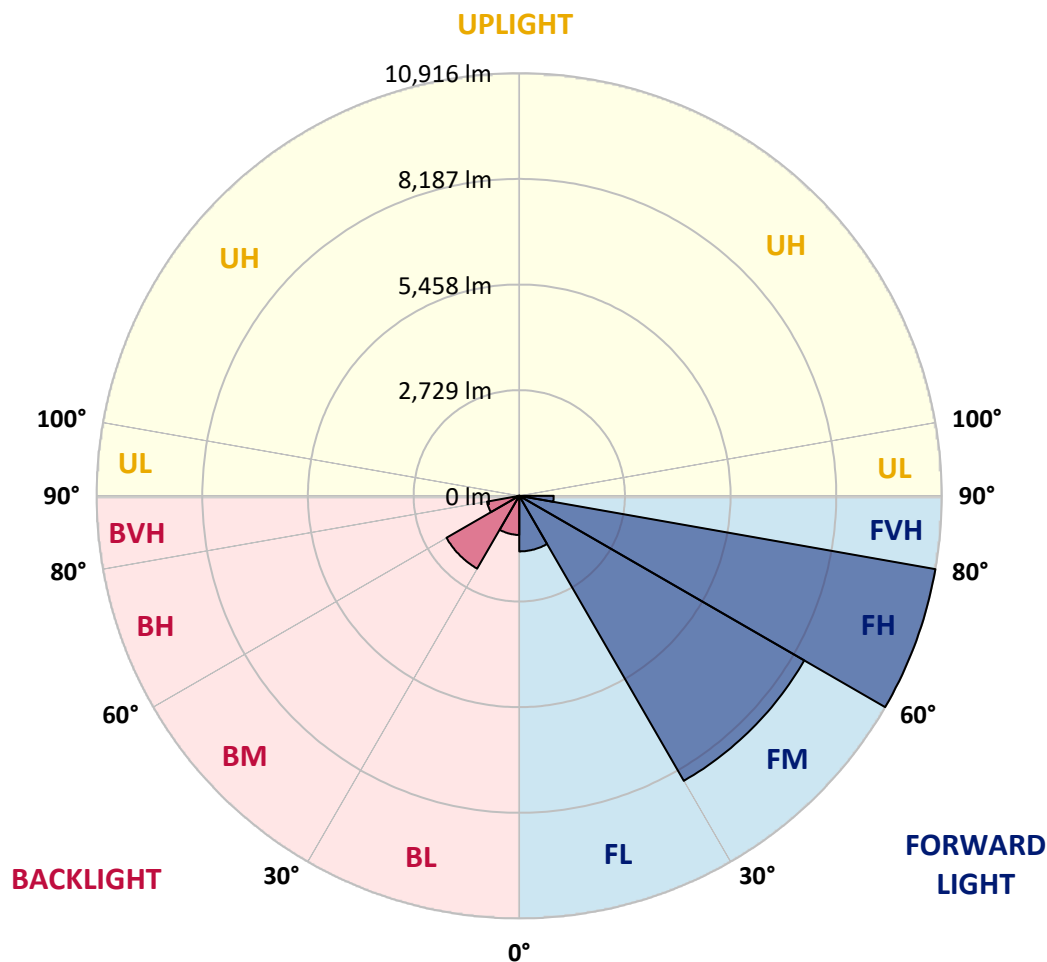
CATALOG NUMBER: CST-CA6-230-727-U-T4-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1436.0  | 5.6       |                         |      |          |
| FM   | (30°-60°)   | 8501.6  | 32.9      |                         |      |          |
| FH   | (60°-80°)   | 10915.6 | 42.3      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 890.5   | 3.4       |                         |      | G5       |
| BL   | (0°-30°)    | 1009.6  | 3.9       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2171.1  | 8.4       | B2/2500                 |      |          |
| BH   | (60°-80°)   | 844.9   | 3.3       | B2/1000                 |      | G2/1000  |
| BVH  | (80°-90°)   | 48.7    | 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



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 36°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2766.3  | 2766.3  | 2766.3  | 2766.3  | 2766.3  | 2766.3  | 2766.3  | 2766.3  | 2766.3  | 2766.3  | 2766.3  |
| 2.5°  | 2822.3  | 2816.3  | 2811.6  | 2813.4  | 2809.8  | 2812.2  | 2806.8  | 2800.2  | 2784.7  | 2778.2  | 2775.2  |
| 5°    | 2847.3  | 2845.5  | 2840.8  | 2837.2  | 2830.6  | 2828.3  | 2822.3  | 2827.7  | 2819.3  | 2797.9  | 2785.3  |
| 7.5°  | 2862.2  | 2861.6  | 2856.3  | 2848.5  | 2852.1  | 2855.1  | 2861.0  | 2852.7  | 2842.0  | 2831.8  | 2806.2  |
| 10°   | 2868.8  | 2868.8  | 2862.2  | 2866.4  | 2884.9  | 2886.7  | 2889.7  | 2895.0  | 2884.9  | 2870.0  | 2844.4  |
| 12.5° | 2885.5  | 2884.3  | 2886.7  | 2900.4  | 2919.5  | 2923.6  | 2938.5  | 2938.5  | 2939.7  | 2930.8  | 2901.0  |
| 15°   | 2927.2  | 2927.2  | 2932.6  | 2945.1  | 2977.9  | 2980.3  | 3002.3  | 3022.0  | 3024.4  | 3011.2  | 2988.6  |
| 17.5° | 3023.8  | 3021.4  | 3018.4  | 3026.1  | 3061.3  | 3062.5  | 3100.7  | 3125.7  | 3132.2  | 3146.6  | 3143.0  |
| 20°   | 3207.3  | 3205.0  | 3204.4  | 3205.0  | 3202.6  | 3199.0  | 3236.6  | 3263.4  | 3296.8  | 3321.8  | 3334.3  |
| 22.5° | 3470.2  | 3464.8  | 3464.8  | 3435.6  | 3413.0  | 3416.6  | 3422.5  | 3437.4  | 3481.5  | 3525.6  | 3572.7  |
| 25°   | 3753.3  | 3749.8  | 3752.7  | 3678.2  | 3647.8  | 3659.7  | 3652.0  | 3675.2  | 3733.1  | 3771.2  | 3821.3  |
| 27.5° | 3984.6  | 3990.0  | 3973.3  | 3915.5  | 3895.8  | 3904.7  | 3886.8  | 3953.6  | 4017.4  | 4084.1  | 4159.8  |
| 30°   | 4272.5  | 4243.9  | 4202.8  | 4132.4  | 4125.3  | 4126.5  | 4125.3  | 4232.6  | 4364.9  | 4460.2  | 4565.2  |
| 32.5° | 4648.6  | 4653.4  | 4561.0  | 4395.3  | 4334.5  | 4326.1  | 4350.0  | 4507.3  | 4686.1  | 4897.7  | 5036.0  |
| 35°   | 5028.9  | 5036.6  | 4969.3  | 4796.4  | 4623.0  | 4596.7  | 4561.6  | 4766.0  | 5024.1  | 5448.5  | 5657.1  |
| 37.5° | 5432.4  | 5459.8  | 5380.0  | 5225.6  | 5019.9  | 4995.5  | 4829.2  | 5030.1  | 5411.5  | 6100.6  | 6374.2  |
| 40°   | 5972.4  | 5943.2  | 5846.7  | 5650.6  | 5459.2  | 5419.9  | 5226.8  | 5332.3  | 5909.8  | 6917.2  | 7115.7  |
| 42.5° | 6370.6  | 6362.2  | 6280.6  | 6086.9  | 5894.3  | 5862.8  | 5707.2  | 5821.6  | 6537.5  | 7745.1  | 7833.9  |
| 45°   | 6686.5  | 6737.8  | 6736.0  | 6614.4  | 6505.9  | 6488.0  | 6396.2  | 6564.9  | 7296.3  | 8526.5  | 8483.0  |
| 47.5° | 6967.2  | 6998.8  | 6948.2  | 6895.1  | 6844.4  | 6850.4  | 6918.4  | 7265.3  | 8071.7  | 9209.0  | 9016.5  |
| 50°   | 7426.8  | 7386.3  | 7159.2  | 7118.6  | 7190.2  | 7193.1  | 7400.0  | 7934.0  | 8925.9  | 9799.1  | 9468.3  |
| 52.5° | 8039.5  | 7995.4  | 7528.7  | 7459.6  | 7628.8  | 7641.4  | 7985.3  | 8600.4  | 9806.8  | 10362.9 | 9917.7  |
| 55°   | 8951.5  | 8849.0  | 8348.9  | 8038.9  | 8116.4  | 8167.1  | 8583.7  | 9241.2  | 10496.4 | 10860.0 | 10258.0 |
| 57.5° | 10071.5 | 10146.0 | 9889.7  | 9189.3  | 8866.8  | 8885.9  | 9268.6  | 9854.5  | 11105.0 | 11295.2 | 10457.1 |
| 60°   | 11255.2 | 11237.3 | 11344.6 | 11049.6 | 10432.1 | 10329.6 | 10134.6 | 10480.4 | 11576.5 | 11661.7 | 10662.2 |
| 62.5° | 11903.7 | 12008.0 | 12365.7 | 12424.7 | 12982.0 | 12927.7 | 11599.1 | 11256.4 | 12121.3 | 11891.8 | 10718.2 |
| 65°   | 11900.1 | 11945.4 | 12611.2 | 13343.2 | 15084.2 | 15068.8 | 14451.2 | 12378.8 | 12527.2 | 12014.6 | 10606.1 |
| 67.5° | 11131.2 | 11201.6 | 11980.0 | 13409.9 | 16055.8 | 16037.3 | 15610.6 | 13956.5 | 12654.7 | 11866.8 | 10083.4 |
| 70°   | 9729.3  | 9753.2  | 10512.5 | 12470.0 | 16446.2 | 16517.2 | 15650.5 | 14562.1 | 12337.6 | 11427.5 | 9130.3  |
| 72.5° | 8026.4  | 7976.9  | 8719.6  | 10649.0 | 15452.0 | 15409.7 | 14988.9 | 13839.1 | 11803.6 | 10574.5 | 7446.5  |
| 75°   | 5909.8  | 6047.5  | 6713.9  | 8550.3  | 13229.9 | 13384.9 | 13571.5 | 12732.8 | 10483.3 | 8714.9  | 5149.3  |
| 77.5° | 3902.3  | 4077.6  | 4751.1  | 6411.1  | 10473.8 | 10714.6 | 11198.0 | 10829.6 | 8528.3  | 6251.4  | 2452.2  |
| 80°   | 2016.4  | 2148.8  | 2754.9  | 4254.0  | 7508.4  | 7855.9  | 8742.3  | 8202.2  | 6046.3  | 2826.5  | 549.0   |
| 82.5° | 762.9   | 745.7   | 1234.4  | 2434.9  | 4814.3  | 5130.2  | 5774.5  | 4918.6  | 2151.7  | 496.5   | 255.1   |
| 85°   | 335.0   | 354.7   | 511.4   | 1110.4  | 2752.6  | 2793.7  | 3271.1  | 1917.5  | 315.3   | 237.2   | 173.5   |
| 87.5° | 144.8   | 166.3   | 214.6   | 319.5   | 928.6   | 1072.3  | 1326.8  | 609.2   | 95.4    | 82.3    | 87.0    |
| 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: P510650

CATALOG NUMBER: CST-CA6-230-727-U-T4-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2766.3 | 2766.3 | 2766.3 | 2766.3 | 2766.3 | 2766.3 | 2766.3 | 2766.3 | 2766.3 | 2766.3 | 2766.3 |
| 2.5°  | 2769.8 | 2766.3 | 2760.3 | 2745.4 | 2721.0 | 2718.0 | 2715.6 | 2713.2 | 2708.5 | 2710.8 | 2724.5 |
| 5°    | 2775.8 | 2769.3 | 2747.8 | 2726.3 | 2704.9 | 2685.8 | 2662.6 | 2653.6 | 2641.7 | 2633.9 | 2648.3 |
| 7.5°  | 2796.1 | 2782.4 | 2750.8 | 2721.6 | 2663.2 | 2635.1 | 2605.3 | 2570.2 | 2545.1 | 2529.0 | 2543.3 |
| 10°   | 2830.0 | 2812.8 | 2773.4 | 2713.2 | 2644.7 | 2567.8 | 2515.3 | 2456.9 | 2409.2 | 2396.1 | 2409.2 |
| 12.5° | 2885.5 | 2859.8 | 2814.0 | 2732.3 | 2610.7 | 2510.0 | 2410.4 | 2333.5 | 2256.6 | 2234.6 | 2241.1 |
| 15°   | 2975.5 | 2955.2 | 2884.9 | 2772.2 | 2611.3 | 2457.5 | 2309.7 | 2185.7 | 2085.0 | 2049.8 | 2047.4 |
| 17.5° | 3119.7 | 3098.3 | 3017.2 | 2851.5 | 2632.8 | 2416.4 | 2210.8 | 2021.8 | 1869.2 | 1791.7 | 1779.2 |
| 20°   | 3326.6 | 3296.8 | 3174.0 | 2968.3 | 2679.2 | 2398.5 | 2119.0 | 1865.0 | 1627.8 | 1482.4 | 1460.3 |
| 22.5° | 3556.6 | 3525.0 | 3343.8 | 3058.3 | 2712.6 | 2363.3 | 2031.3 | 1691.6 | 1379.3 | 1201.6 | 1176.6 |
| 25°   | 3842.7 | 3773.6 | 3506.6 | 3143.6 | 2704.9 | 2289.4 | 1888.9 | 1456.2 | 1117.6 | 963.8  | 947.1  |
| 27.5° | 4125.3 | 4037.6 | 3672.3 | 3188.3 | 2670.9 | 2172.0 | 1680.3 | 1180.8 | 875.0  | 765.9  | 752.2  |
| 30°   | 4475.7 | 4306.5 | 3819.5 | 3209.1 | 2585.1 | 1996.2 | 1400.7 | 897.7  | 655.1  | 580.0  | 566.8  |
| 32.5° | 4892.4 | 4636.1 | 3957.8 | 3185.9 | 2442.0 | 1728.0 | 1089.0 | 657.4  | 487.0  | 439.9  | 439.3  |
| 35°   | 5441.9 | 5040.2 | 4109.8 | 3109.6 | 2222.7 | 1438.9 | 763.5  | 449.4  | 379.7  | 363.6  | 366.6  |
| 37.5° | 6084.5 | 5587.4 | 4264.1 | 2984.4 | 1974.7 | 1100.9 | 509.0  | 346.3  | 333.8  | 334.4  | 335.0  |
| 40°   | 6762.2 | 6191.8 | 4472.2 | 2808.6 | 1673.7 | 796.9  | 366.6  | 311.1  | 310.5  | 316.5  | 318.3  |
| 42.5° | 7409.5 | 6778.9 | 4728.5 | 2574.3 | 1358.4 | 526.9  | 317.7  | 296.8  | 289.1  | 291.5  | 293.3  |
| 45°   | 8010.9 | 7282.5 | 4946.6 | 2346.1 | 1020.4 | 376.1  | 311.7  | 280.1  | 268.2  | 267.0  | 268.2  |
| 47.5° | 8495.5 | 7686.1 | 5079.5 | 2077.8 | 727.2  | 312.3  | 299.2  | 264.6  | 248.0  | 244.4  | 242.6  |
| 50°   | 8864.5 | 7985.9 | 5127.8 | 1773.8 | 491.7  | 298.0  | 282.5  | 246.8  | 226.5  | 227.1  | 227.1  |
| 52.5° | 9224.5 | 8258.3 | 5071.8 | 1467.5 | 361.8  | 285.5  | 271.2  | 232.5  | 211.0  | 222.3  | 225.3  |
| 55°   | 9483.8 | 8372.7 | 4908.5 | 1136.1 | 301.6  | 270.0  | 258.7  | 215.8  | 200.9  | 219.3  | 225.3  |
| 57.5° | 9635.2 | 8462.7 | 4608.7 | 820.2  | 276.6  | 255.1  | 242.6  | 200.3  | 186.6  | 191.3  | 194.3  |
| 60°   | 9729.3 | 8337.0 | 4212.3 | 560.9  | 263.5  | 243.2  | 226.5  | 190.1  | 171.7  | 160.3  | 158.5  |
| 62.5° | 9677.5 | 8022.2 | 3690.1 | 385.6  | 249.7  | 230.1  | 212.8  | 180.6  | 156.2  | 141.3  | 140.1  |
| 65°   | 9254.9 | 7439.9 | 2833.0 | 312.3  | 241.4  | 224.1  | 204.4  | 171.7  | 145.4  | 131.1  | 129.3  |
| 67.5° | 8471.1 | 6393.2 | 1654.6 | 277.8  | 237.8  | 218.2  | 197.9  | 163.3  | 139.5  | 124.0  | 121.6  |
| 70°   | 7183.0 | 4808.9 | 554.3  | 248.0  | 237.2  | 217.6  | 192.5  | 157.4  | 132.9  | 116.8  | 114.4  |
| 72.5° | 5182.1 | 2901.6 | 270.0  | 218.2  | 221.7  | 208.6  | 188.4  | 152.6  | 128.7  | 108.5  | 104.3  |
| 75°   | 2945.1 | 944.7  | 243.8  | 188.4  | 206.2  | 199.1  | 186.0  | 153.2  | 130.5  | 98.3   | 93.6   |
| 77.5° | 838.0  | 276.0  | 235.4  | 160.3  | 194.9  | 205.6  | 174.0  | 138.3  | 133.5  | 91.2   | 85.2   |
| 80°   | 283.1  | 245.6  | 227.1  | 124.6  | 157.4  | 169.9  | 150.8  | 121.6  | 134.7  | 82.9   | 76.9   |
| 82.5° | 227.1  | 246.8  | 190.7  | 99.5   | 119.8  | 128.7  | 119.8  | 109.1  | 109.1  | 73.9   | 69.1   |
| 85°   | 181.8  | 228.9  | 121.0  | 79.3   | 89.4   | 98.9   | 84.6   | 81.7   | 76.3   | 62.0   | 60.2   |
| 87.5° | 105.5  | 71.5   | 50.1   | 40.5   | 37.6   | 38.1   | 32.8   | 39.3   | 48.3   | 42.3   | 41.7   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-5

Luminaire Tested: CST-CA6-230-727-U-T4

Test Date: 04/22/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-5  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/22/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA6-230-727-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2613    | CRI (Ra): | 72.6 |      |       |
| CIE u':                   | 0.2668  | R1:       | 69.4 | R9:  | -28.6 |
| CIE v':                   | 0.5272  | R2:       | 84.5 | R10: | 65.5  |
| Duv:                      | -0.0012 | R3:       | 95.0 | R11: | 63.4  |
| CIE x:                    | 0.4648  | R4:       | 67.5 | R12: | 56.9  |
| CIE y:                    | 0.4082  | R5:       | 68.5 | R13: | 72.3  |
| CIE z:                    | 0.1270  | R6:       | 79.7 | R14: | 97.8  |
| Peak Wavelength (nm):     | 603     | R7:       | 75.4 |      |       |
| Dominant Wavelength (nm): | 585     | R8:       | 41.2 |      |       |
| Purity:                   | 62.2    |           |      |      |       |
|                           |         |           |      |      |       |
| Rf:                       | 75.3    |           |      |      |       |
| Rg:                       | 95.8    |           |      |      |       |



### Test Conditions

Stabilization Time: 121M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.5/25%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2104-215-5

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

REPORT NUMBER: SP1-2104-215-5

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 2700K 7-step quadrangle

REPORT NUMBER: SP1-2104-215-5

### Photopic Flux vs. Wavelength



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 11220            | 0.0              | 490       | 69401            | 9.9              | 620       | 692536           | 180.2            | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 16.3             | 625       | 651217           | 143.7            | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 26.9             | 630       | 598624           | 108.3            | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 44.7             | 635       | 546251           | 82.1             | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 67.7             | 640       | 499000           | 59.6             | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 96.4             | 645       | 451749           | 43.5             | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 127.6            | 650       | 406338           | 29.7             | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.0              | 525       | 288012           | 154.6            | 655       | 360522           | 20.7             | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.0              | 530       | 310825           | 183.0            | 660       | 321663           | 13.4             | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.0              | 535       | 330894           | 205.2            | 665       | 283133           | 9.0              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.0              | 540       | 349086           | 227.5            | 670       | 244093           | 5.3              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 0.0              | 545       | 372506           | 247.9            | 675       | 210996           | 3.5              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 0.1              | 550       | 403721           | 274.3            | 680       | 183942           | 2.1              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 0.2              | 555       | 442032           | 301.9            | 685       | 158373           | 1.4              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 0.6              | 560       | 485515           | 329.9            | 690       | 137120           | 0.8              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 1.3              | 565       | 532962           | 354.4            | 695       | 116757           | 0.5              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 2.6              | 570       | 582457           | 378.7            | 700       | 102093           | 0.3              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 5.3              | 575       | 634550           | 394.8            | 705       | 87819            | 0.2              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 8.5              | 580       | 686476           | 407.9            | 710       | 78011            | 0.1              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 8.9              | 585       | 730571           | 405.9            | 715       | 70264            | 0.1              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 6.9              | 590       | 768228           | 397.2            | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 6.6              | 595       | 780593           | 370.0            | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 5.9              | 600       | 791888           | 341.3            | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 5.3              | 605       | 789088           | 305.6            | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 5.7              | 610       | 765121           | 262.9            | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 7.2              | 615       | 735839           | 222.1            | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-5

### Scotopic Flux vs. Wavelength



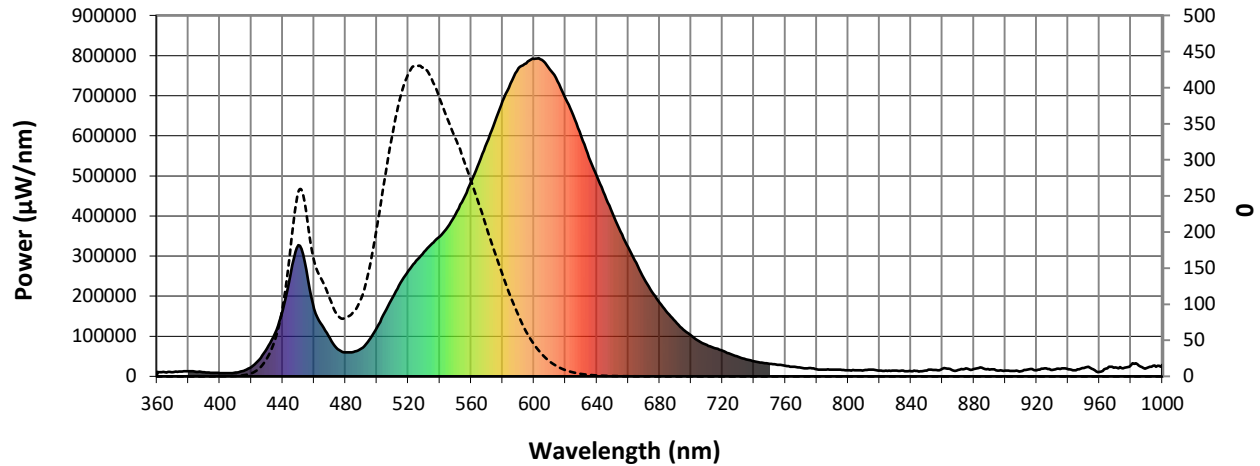
Scotopic Lumens: 37163.1

S/P: 1.07

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 11220            | 0.0              | 490       | 69401            | 106.9            | 620       | 692536           | 8.7              | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 145.6            | 625       | 651217           | 5.5              | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 204.0            | 630       | 598624           | 3.4              | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 271.4            | 635       | 546251           | 2.1              | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 334.0            | 640       | 499000           | 1.3              | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 385.9            | 645       | 451749           | 0.8              | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 418.3            | 650       | 406338           | 0.5              | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.1              | 525       | 288012           | 430.9            | 655       | 360522           | 0.3              | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.1              | 530       | 310825           | 428.5            | 660       | 321663           | 0.2              | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.2              | 535       | 330894           | 412.3            | 665       | 283133           | 0.1              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.6              | 540       | 349086           | 385.7            | 670       | 244093           | 0.1              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 1.4              | 545       | 372506           | 357.2            | 675       | 210996           | 0.0              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 3.9              | 550       | 403721           | 330.1            | 680       | 183942           | 0.0              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 10.2             | 555       | 442032           | 302.1            | 685       | 158373           | 0.0              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 23.8             | 560       | 485515           | 271.4            | 690       | 137120           | 0.0              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 47.8             | 565       | 532962           | 239.1            | 695       | 116757           | 0.0              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 92.0             | 570       | 582457           | 205.6            | 700       | 102093           | 0.0              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 171.5            | 575       | 634550           | 172.8            | 705       | 87819            | 0.0              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 253.7            | 580       | 686476           | 141.4            | 710       | 78011            | 0.0              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 232.1            | 585       | 730571           | 111.7            | 715       | 70264            | 0.0              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 162.6            | 590       | 768228           | 85.5             | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 134.5            | 595       | 780593           | 62.2             | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 109.1            | 600       | 791888           | 44.6             | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 84.8             | 605       | 789088           | 31.0             | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 80.8             | 610       | 765121           | 20.7             | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 88.5             | 615       | 735839           | 13.6             | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-5

### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 13012.4**      **M/P: 0.38**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 11220            | 0.0              | 490       | 69401            | 57.8             | 620       | 692536           | 0.5              | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 74.3             | 625       | 651217           | 0.3              | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 98.0             | 630       | 598624           | 0.2              | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 122.5            | 635       | 546251           | 0.1              | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 141.5            | 640       | 499000           | 0.1              | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 152.1            | 645       | 451749           | 0.0              | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 153.2            | 650       | 406338           | 0.0              | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.0              | 525       | 288012           | 146.1            | 655       | 360522           | 0.0              | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.1              | 530       | 310825           | 134.3            | 660       | 321663           | 0.0              | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.1              | 535       | 330894           | 119.1            | 665       | 283133           | 0.0              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.4              | 540       | 349086           | 102.2            | 670       | 244093           | 0.0              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 0.9              | 545       | 372506           | 86.5             | 675       | 210996           | 0.0              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 2.7              | 550       | 403721           | 72.5             | 680       | 183942           | 0.0              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 6.5              | 555       | 442032           | 59.6             | 685       | 158373           | 0.0              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 14.8             | 560       | 485515           | 47.9             | 690       | 137120           | 0.0              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 28.5             | 565       | 532962           | 37.4             | 695       | 116757           | 0.0              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 55.0             | 570       | 582457           | 28.5             | 700       | 102093           | 0.0              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 101.0            | 575       | 634550           | 21.1             | 705       | 87819            | 0.0              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 150.8            | 580       | 686476           | 15.4             | 710       | 78011            | 0.0              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 139.2            | 585       | 730571           | 10.9             | 715       | 70264            | 0.0              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 99.2             | 590       | 768228           | 7.5              | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 83.2             | 595       | 780593           | 5.0              | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 67.8             | 600       | 791888           | 3.3              | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 51.8             | 605       | 789088           | 2.2              | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 48.1             | 610       | 765121           | 1.4              | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 50.3             | 615       | 735839           | 0.9              | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

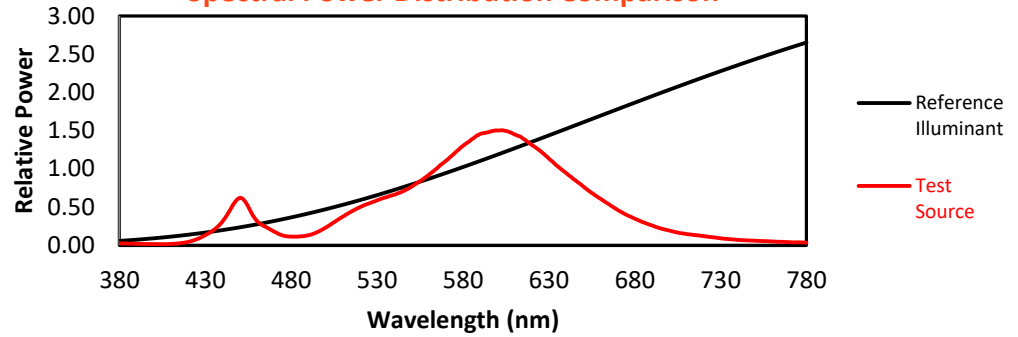
REPORT NUMBER: SP1-2104-215-5

TM-30-18

### Summary

$R_f = 75.3$   
 $R_g = 95.8$   
 CIE  $R_a = 72.6$   
 $R_g = -28.6$

### Spectral Power Distribution Comparison

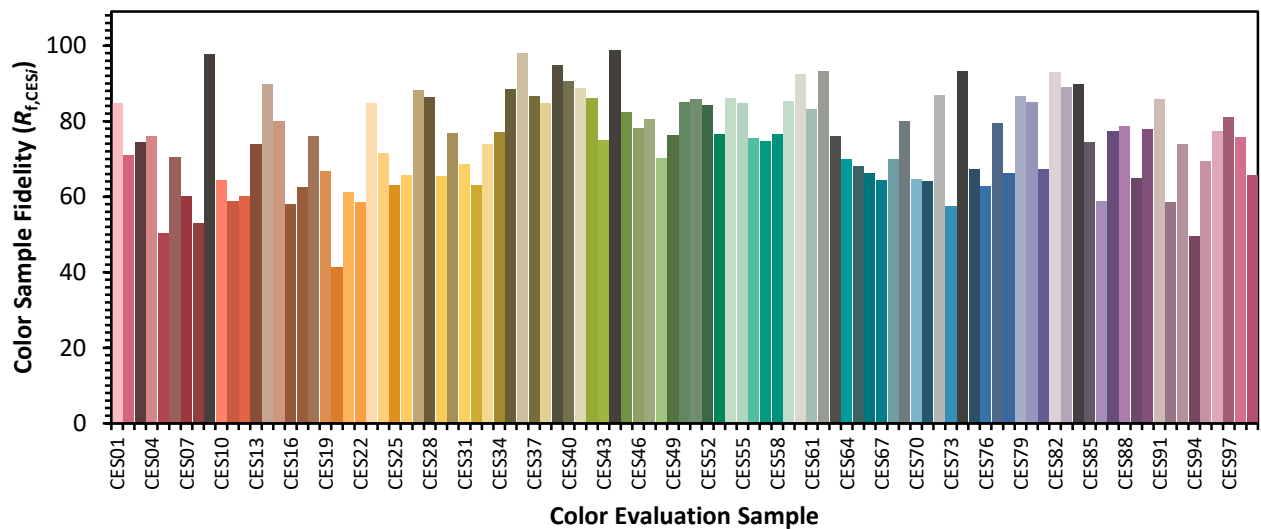


### Color Vector Graphics

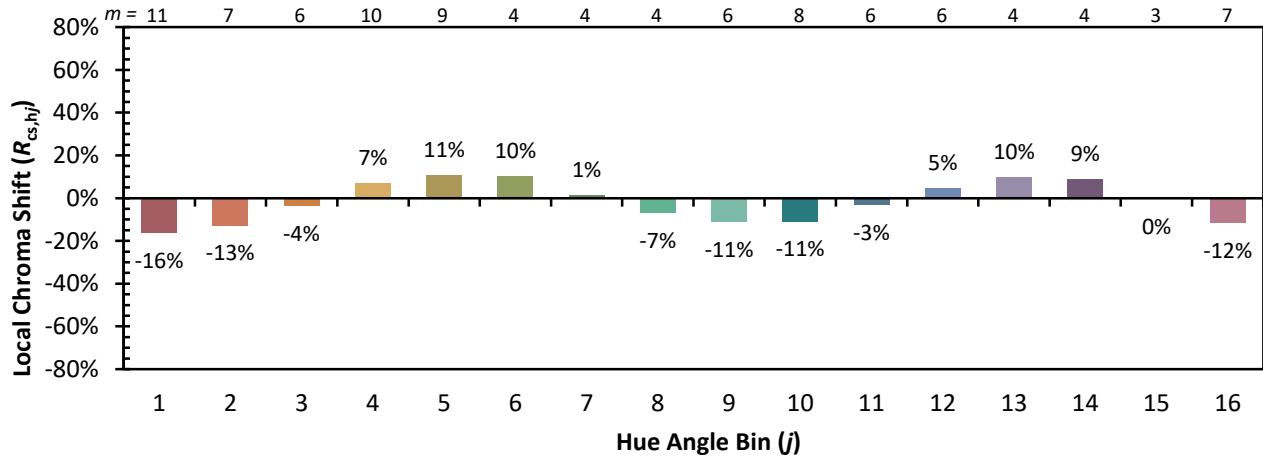


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 66 | CES51 = 86 | CES76 = 63 |
| CES02 = 64 | CES27 = 88 | CES52 = 84 | CES77 = 79 |
| CES03 = 31 | CES28 = 86 | CES53 = 77 | CES78 = 66 |
| CES04 = 71 | CES29 = 65 | CES54 = 86 | CES79 = 87 |
| CES05 = 50 | CES30 = 77 | CES55 = 85 | CES80 = 85 |
| CES06 = 52 | CES31 = 69 | CES56 = 75 | CES81 = 67 |
| CES07 = 42 | CES32 = 63 | CES57 = 75 | CES82 = 93 |
| CES08 = 41 | CES33 = 74 | CES58 = 77 | CES83 = 89 |
| CES09 = 29 | CES34 = 77 | CES59 = 85 | CES84 = 90 |
| CES10 = 77 | CES35 = 88 | CES60 = 92 | CES85 = 74 |
| CES11 = 60 | CES36 = 98 | CES61 = 83 | CES86 = 59 |
| CES12 = 66 | CES37 = 86 | CES62 = 93 | CES87 = 77 |
| CES13 = 44 | CES38 = 85 | CES63 = 76 | CES88 = 79 |
| CES14 = 74 | CES39 = 95 | CES64 = 70 | CES89 = 65 |
| CES15 = 72 | CES40 = 91 | CES65 = 68 | CES90 = 78 |
| CES16 = 48 | CES41 = 89 | CES66 = 66 | CES91 = 86 |
| CES17 = 51 | CES42 = 86 | CES67 = 64 | CES92 = 59 |
| CES18 = 57 | CES43 = 75 | CES68 = 70 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 80 | CES94 = 50 |
| CES20 = 67 | CES45 = 83 | CES70 = 65 | CES95 = 69 |
| CES21 = 88 | CES46 = 78 | CES71 = 64 | CES96 = 77 |
| CES22 = 80 | CES47 = 80 | CES72 = 87 | CES97 = 81 |
| CES23 = 92 | CES48 = 70 | CES73 = 58 | CES98 = 76 |
| CES24 = 91 | CES49 = 76 | CES74 = 93 | CES99 = 66 |
| CES25 = 73 | CES50 = 85 | CES75 = 67 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)