

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: P510816

Luminaire Tested: **CST-CA8-480-722-U-T2-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510816  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-15)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: CST-CA8-480-722-U-T2-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (8) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 52715 lumens  
Efficiency: N/A  
Efficacy: 109.6 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B4 - U0 - G5

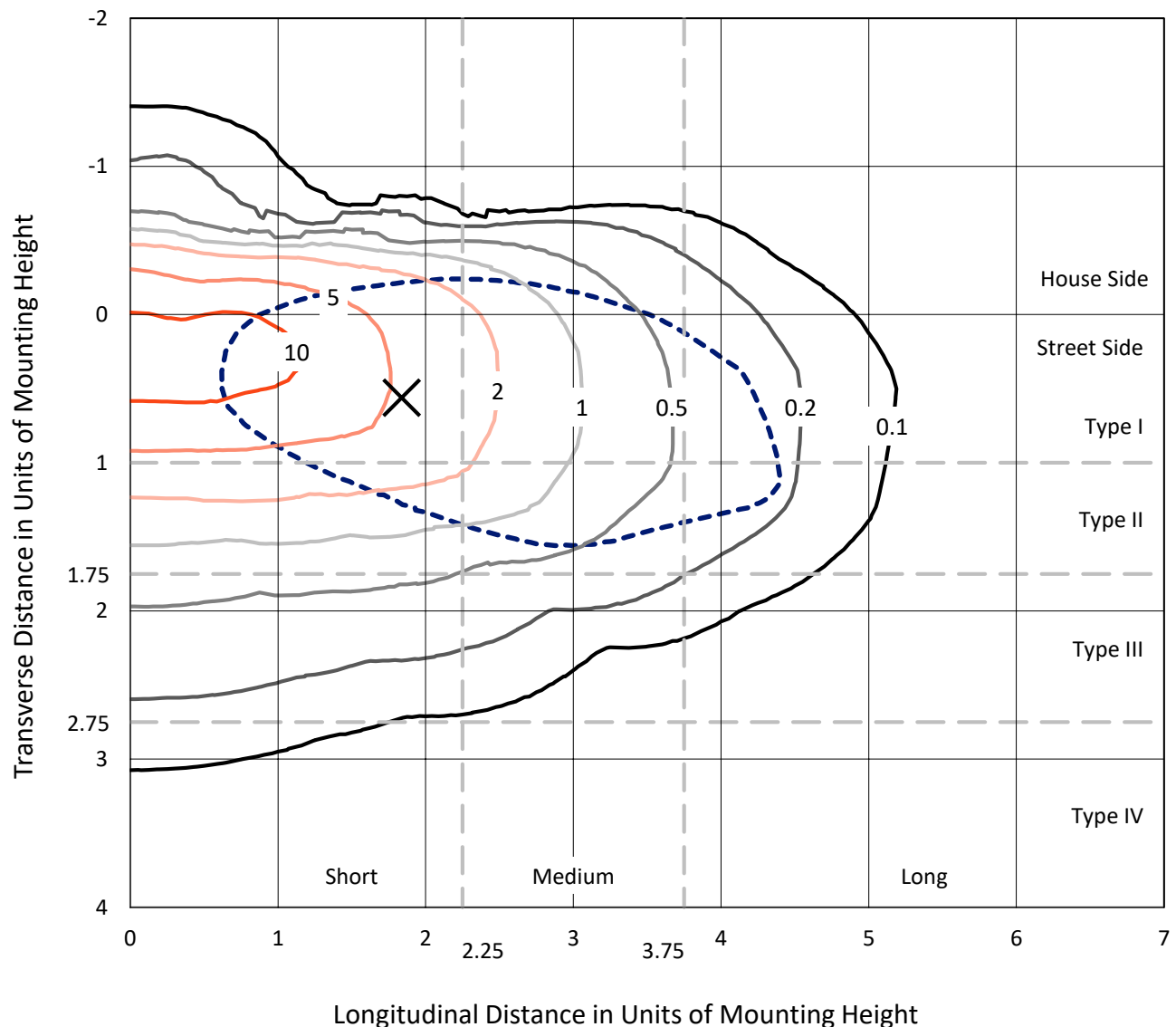
Input Watts (W): 480.8  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P510816  
 CATALOG NUMBER: CST-CA8-480-722-U-T2-HSS

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

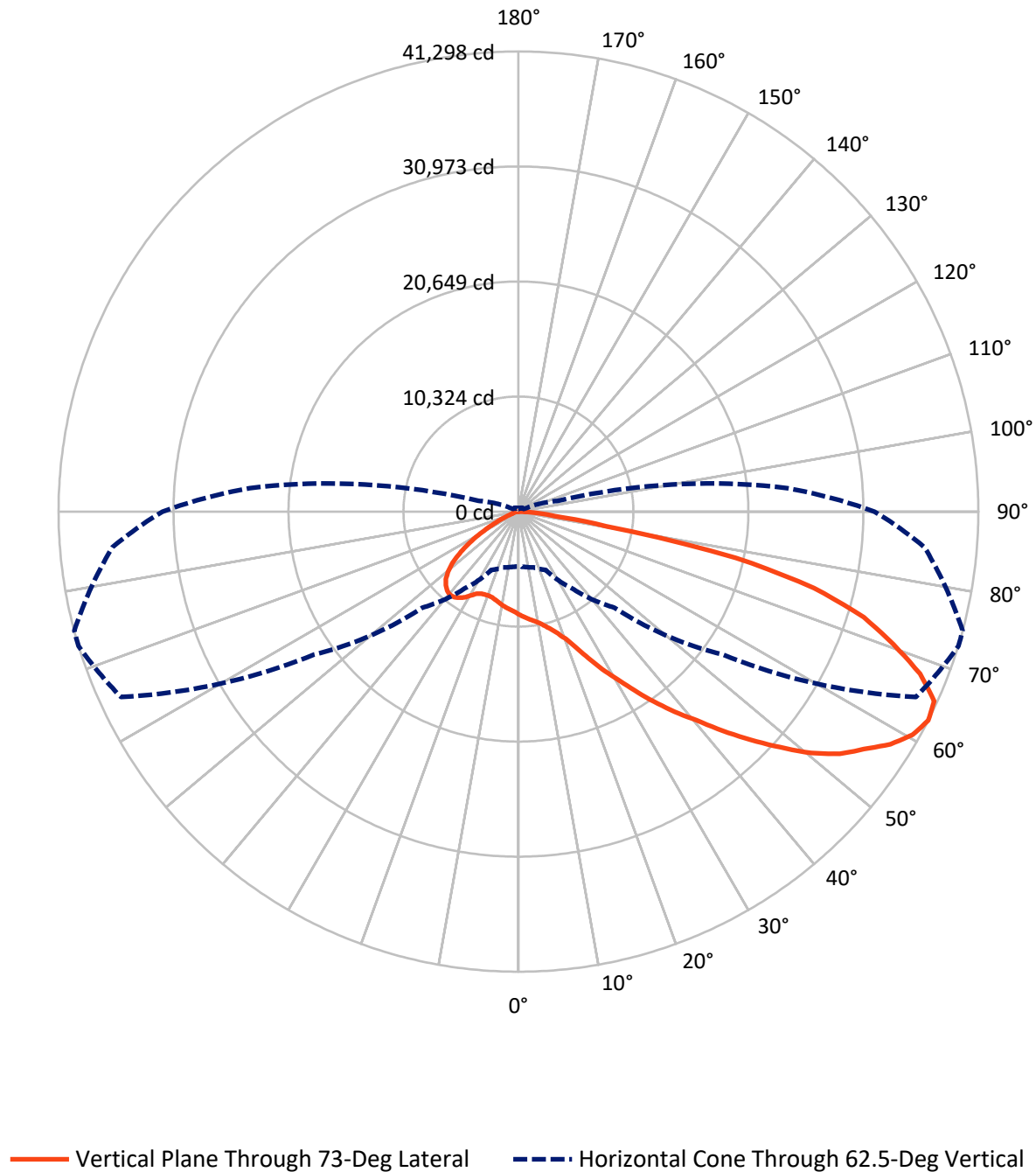


Based on 30 foot mounting height. Maximum calculated value = 12.8 fc  
 Type II - Short - N/A

FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

REPORT NUMBER: P510816  
CATALOG NUMBER: CST-CA8-480-722-U-T2-HSS

## Luminous Intensity Polar Plot



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

REPORT NUMBER: P510816

CATALOG NUMBER: CST-CA8-480-722-U-T2-HSS

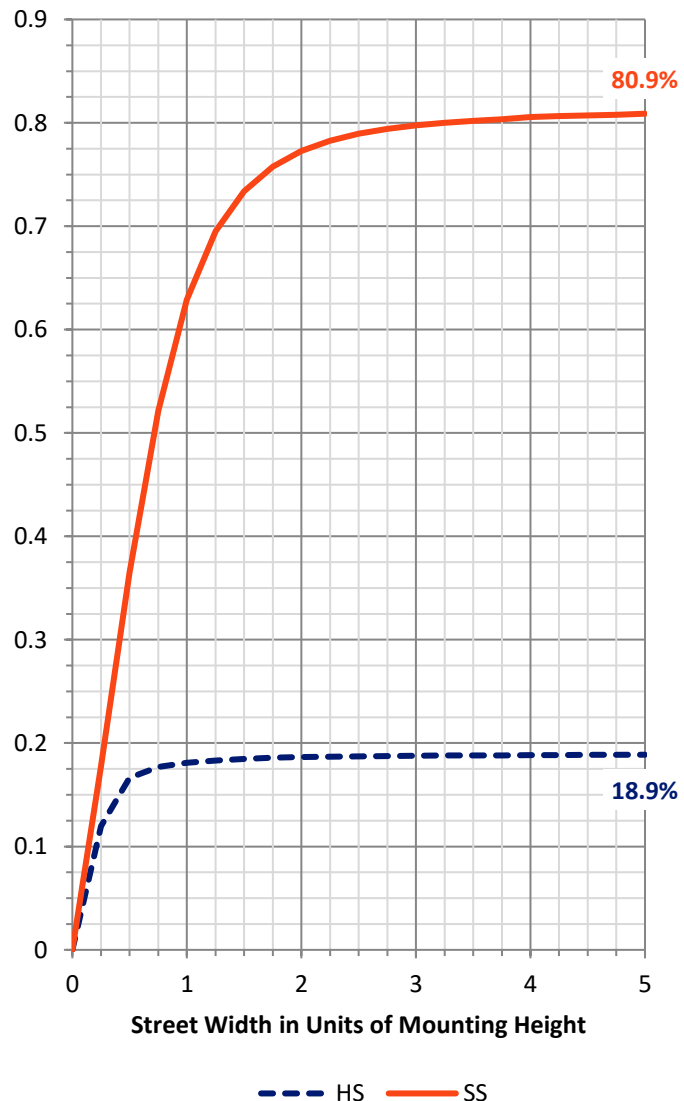
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 10084.1  | 0.0    | 10084.1 |
|                    | % Fixture | 19.1     | 0.0    | 19.1    |
| <b>Street Side</b> | Lumens    | 42630.9  | 0.0    | 42630.9 |
|                    | % Fixture | 80.9     | 0.0    | 80.9    |
| <b>Total</b>       | Lumens    | 52715.0  | 0.0    | 52715.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 883.0   | 1.7       |
| 10°-20°   | 2655.9  | 5.0       |
| 20°-30°   | 4588.9  | 8.7       |
| 30°-40°   | 6900.5  | 13.1      |
| 40°-50°   | 9201.2  | 17.5      |
| 50°-60°   | 10836.2 | 20.6      |
| 60°-70°   | 10773.1 | 20.4      |
| 70°-80°   | 6185.1  | 11.7      |
| 80°-90°   | 690.9   | 1.3       |
| 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°    | 52715.0 | 100.0     |
| 0°-180°   | 52715.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P510816

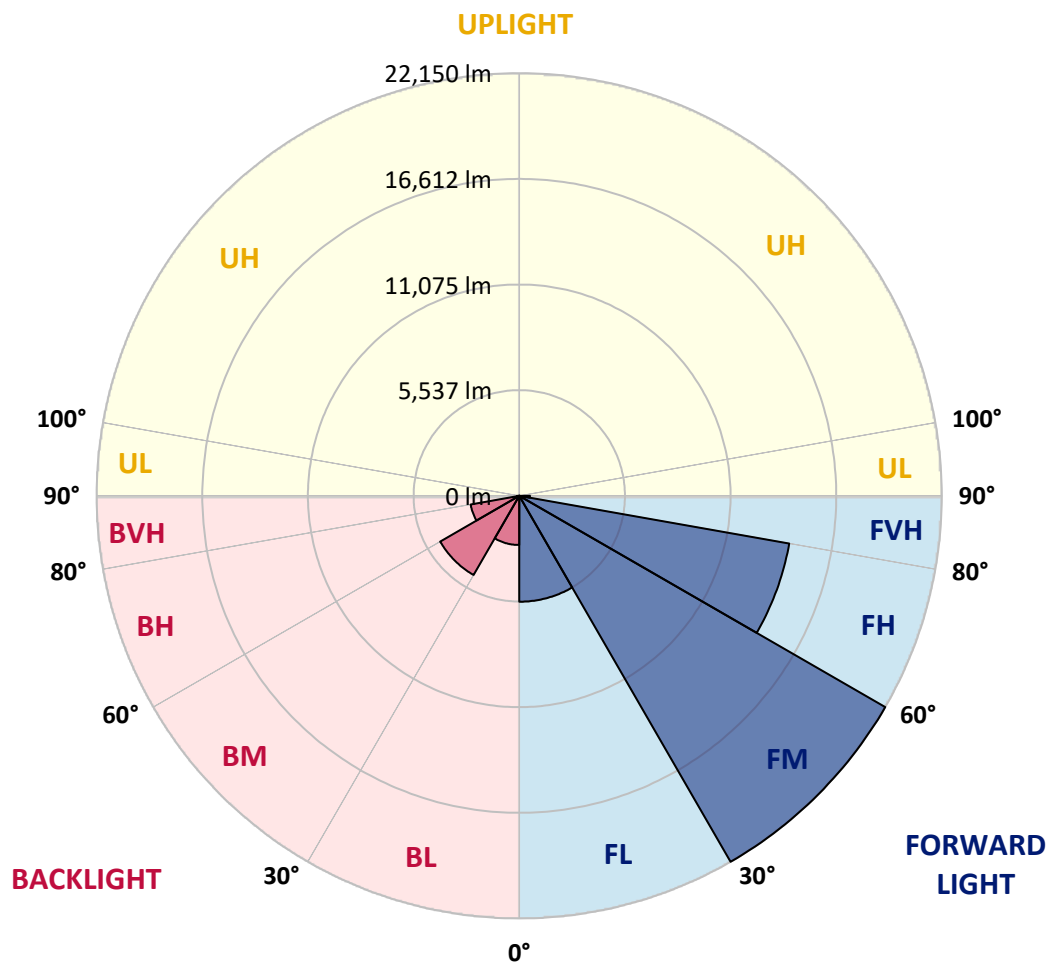
CATALOG NUMBER: CST-CA8-480-722-U-T2-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 5550.8  | 10.5      |                         |      |         |
| FM   | (30°-60°)   | 22149.6 | 42.0      |                         |      |         |
| FH   | (60°-80°)   | 14369.3 | 27.3      |                         |      | G5      |
| FVH  | (80°-90°)   | 561.2   | 1.1       |                         |      | G4/750  |
| BL   | (0°-30°)    | 2577.0  | 4.9       | B4/5000                 |      |         |
| BM   | (30°-60°)   | 4788.4  | 9.1       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 2589.0  | 4.9       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 129.8   | 0.2       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B4-U0-G5**

Type II Short



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

REPORT NUMBER: P510816

CATALOG NUMBER: CST-CA8-480-722-U-T2-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 73°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 9245.0  | 9245.0  | 9245.0  | 9245.0  | 9245.0  | 9245.0  | 9245.0  | 9245.0  | 9245.0  | 9245.0  | 9245.0  |
| 2.5°  | 9891.1  | 9915.9  | 9886.4  | 9873.3  | 9859.1  | 9766.8  | 9659.2  | 9549.1  | 9460.4  | 9446.2  | 9330.2  |
| 5°    | 10585.7 | 10598.7 | 10550.2 | 10494.6 | 10398.7 | 10246.1 | 10053.2 | 9862.7  | 9685.2  | 9637.9  | 9426.1  |
| 7.5°  | 11119.3 | 11094.5 | 11082.7 | 11035.3 | 10951.3 | 10783.3 | 10491.0 | 10178.6 | 9904.1  | 9837.8  | 9516.0  |
| 10°   | 11619.9 | 11609.2 | 11519.3 | 11460.1 | 11326.4 | 11171.4 | 10931.2 | 10534.8 | 10147.9 | 10041.4 | 9594.1  |
| 12.5° | 12161.8 | 12138.1 | 12101.5 | 11973.7 | 11864.8 | 11603.3 | 11313.4 | 10952.5 | 10521.8 | 10379.8 | 9727.8  |
| 15°   | 12649.3 | 12585.4 | 12565.3 | 12431.6 | 12321.6 | 12121.6 | 11830.5 | 11411.6 | 10951.3 | 10829.4 | 9982.2  |
| 17.5° | 13113.2 | 13083.6 | 13038.6 | 12947.5 | 12824.4 | 12670.6 | 12437.5 | 11989.1 | 11513.4 | 11335.9 | 10414.1 |
| 20°   | 13507.2 | 13470.5 | 13431.5 | 13456.3 | 13429.1 | 13330.9 | 13184.2 | 12802.0 | 12221.0 | 12049.4 | 10939.5 |
| 22.5° | 13781.7 | 13780.5 | 13936.7 | 14027.9 | 14079.9 | 14076.4 | 14040.9 | 13824.3 | 13239.8 | 13065.8 | 11725.2 |
| 25°   | 14010.1 | 14027.9 | 14225.5 | 14572.2 | 14882.2 | 14910.6 | 15161.4 | 15058.5 | 14561.5 | 14380.5 | 12907.3 |
| 27.5° | 14077.5 | 14113.0 | 14471.6 | 15017.1 | 15488.0 | 15940.0 | 16308.0 | 16496.2 | 16035.9 | 15819.3 | 14178.1 |
| 30°   | 14126.1 | 14140.3 | 14491.7 | 15144.9 | 16137.6 | 16853.5 | 17511.4 | 17829.7 | 17433.3 | 17274.8 | 15594.5 |
| 32.5° | 13784.1 | 13788.8 | 14327.2 | 15316.4 | 16614.5 | 17855.8 | 18634.4 | 19234.3 | 19130.2 | 18920.7 | 17143.4 |
| 35°   | 13313.1 | 13400.7 | 14018.4 | 15150.8 | 17007.4 | 18776.4 | 19836.6 | 20731.2 | 20939.4 | 20789.1 | 18691.2 |
| 37.5° | 12731.0 | 12799.6 | 13461.1 | 14904.7 | 17093.7 | 19409.4 | 20771.4 | 22252.9 | 22797.2 | 22772.3 | 20559.6 |
| 40°   | 12015.1 | 12099.1 | 12890.7 | 14374.6 | 17051.1 | 19869.7 | 21868.3 | 23937.9 | 24628.9 | 24550.8 | 22412.6 |
| 42.5° | 11169.0 | 11292.1 | 12060.0 | 13693.0 | 16739.9 | 20151.4 | 22766.4 | 25653.6 | 26897.3 | 26846.4 | 24052.6 |
| 45°   | 10332.5 | 10398.7 | 11099.2 | 12744.0 | 16167.2 | 20242.5 | 23611.3 | 28017.8 | 29223.6 | 29166.8 | 26028.7 |
| 47.5° | 9469.8  | 9527.8  | 10259.1 | 11744.1 | 15173.3 | 20059.1 | 24279.8 | 30048.4 | 31593.7 | 31536.9 | 27991.8 |
| 50°   | 7463.0  | 7681.9  | 9181.1  | 10864.9 | 14040.9 | 19539.6 | 24910.5 | 32578.2 | 34073.9 | 33832.5 | 29711.1 |
| 52.5° | 6385.0  | 6464.3  | 7241.7  | 9978.6  | 12910.8 | 18653.3 | 25331.8 | 34922.3 | 36113.9 | 35766.0 | 31469.5 |
| 55°   | 5968.5  | 6021.7  | 6402.8  | 8344.5  | 11849.4 | 17312.7 | 25827.6 | 37272.3 | 37643.9 | 37555.1 | 32903.6 |
| 57.5° | 5652.6  | 5711.7  | 5983.9  | 6969.6  | 10731.2 | 15433.6 | 25672.6 | 38925.4 | 39390.4 | 39106.4 | 34426.5 |
| 60°   | 5205.3  | 5277.5  | 5638.4  | 6257.2  | 9460.4  | 13526.1 | 24308.2 | 39602.2 | 40660.1 | 40340.6 | 35584.9 |
| 62.5° | 4923.7  | 4971.0  | 5178.1  | 5778.0  | 8407.2  | 12184.3 | 22366.5 | 39384.5 | 41297.9 | 41286.0 | 36589.6 |
| 65°   | 4541.5  | 4611.3  | 4832.5  | 5318.9  | 7470.1  | 11144.2 | 20534.7 | 38308.9 | 41023.3 | 41034.0 | 36796.6 |
| 67.5° | 4141.5  | 4169.9  | 4401.8  | 4792.3  | 6366.1  | 10191.6 | 18164.6 | 36468.9 | 38885.1 | 39128.9 | 35363.7 |
| 70°   | 3642.2  | 3628.0  | 3878.8  | 4164.0  | 5202.9  | 8653.4  | 14620.7 | 33195.9 | 35725.8 | 35826.3 | 32465.8 |
| 72.5° | 2865.9  | 2878.9  | 2948.7  | 3146.4  | 3949.8  | 6809.8  | 10609.3 | 28046.2 | 32423.2 | 32601.9 | 28762.1 |
| 75°   | 1926.4  | 1947.7  | 2273.1  | 2466.0  | 2841.1  | 4894.1  | 6671.4  | 18931.4 | 27409.6 | 27913.7 | 23540.3 |
| 77.5° | 1469.6  | 1482.7  | 1577.3  | 1787.9  | 2055.4  | 3488.3  | 3616.1  | 10315.9 | 19954.9 | 21151.2 | 18415.5 |
| 80°   | 1041.3  | 1046.0  | 952.5   | 847.2   | 1094.5  | 2366.6  | 2135.8  | 4393.5  | 7951.7  | 9396.5  | 10816.4 |
| 82.5° | 466.2   | 459.1   | 540.8   | 449.6   | 630.7   | 915.9   | 1008.2  | 2132.3  | 3302.6  | 3549.9  | 3864.6  |
| 85°   | 216.5   | 242.6   | 278.1   | 233.1   | 375.1   | 353.8   | 392.9   | 908.8   | 1547.7  | 1708.7  | 1699.2  |
| 87.5° | 53.2    | 58.0    | 73.4    | 93.5    | 136.1   | 120.7   | 118.3   | 267.4   | 345.5   | 344.3   | 528.9   |
| 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: P510816

CATALOG NUMBER: CST-CA8-480-722-U-T2-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 9245.0  | 9245.0  | 9245.0  | 9245.0 | 9245.0 | 9245.0 | 9245.0 | 9245.0 | 9245.0 | 9245.0 | 9245.0 |
| 2.5°  | 9250.9  | 9189.4  | 9043.9  | 8903.0 | 8769.3 | 8680.6 | 8581.2 | 8477.1 | 8414.3 | 8384.8 | 8448.7 |
| 5°    | 9297.1  | 9179.9  | 8901.9  | 8622.6 | 8385.9 | 8183.6 | 8041.6 | 7920.9 | 7855.8 | 7861.7 | 7865.3 |
| 7.5°  | 9336.1  | 9171.6  | 8782.3  | 8388.3 | 8019.1 | 7768.3 | 7582.5 | 7452.3 | 7377.8 | 7321.0 | 7363.6 |
| 10°   | 9370.4  | 9137.3  | 8642.7  | 8117.3 | 7716.2 | 7344.7 | 7092.6 | 6935.2 | 6798.0 | 6721.1 | 6781.4 |
| 12.5° | 9407.1  | 9124.3  | 8486.5  | 7874.8 | 7355.3 | 6940.0 | 6594.5 | 6438.3 | 6303.4 | 6245.4 | 6282.1 |
| 15°   | 9566.9  | 9174.0  | 8341.0  | 7589.6 | 6999.1 | 6461.9 | 6089.2 | 5897.5 | 5791.0 | 5721.2 | 5736.6 |
| 17.5° | 9841.4  | 9305.4  | 8247.5  | 7291.4 | 6601.6 | 6033.6 | 5550.8 | 5327.2 | 5150.8 | 5101.1 | 5088.1 |
| 20°   | 10231.9 | 9555.0  | 8247.5  | 7039.4 | 6150.7 | 5557.9 | 5001.7 | 4624.3 | 4349.8 | 4246.8 | 4326.1 |
| 22.5° | 10887.4 | 9979.8  | 8329.1  | 6811.0 | 5762.6 | 5064.5 | 4401.8 | 3825.6 | 3455.2 | 3304.9 | 3392.5 |
| 25°   | 11804.5 | 10636.6 | 8461.7  | 6611.0 | 5408.8 | 4496.5 | 3641.0 | 2978.3 | 2570.1 | 2391.4 | 2389.1 |
| 27.5° | 13001.9 | 11641.2 | 8729.1  | 6447.7 | 4985.2 | 3761.7 | 2847.0 | 2209.2 | 1825.8 | 1718.1 | 1733.5 |
| 30°   | 14329.6 | 12729.8 | 9234.4  | 6211.1 | 4470.5 | 2939.3 | 2073.1 | 1623.5 | 1353.7 | 1211.7 | 1214.1 |
| 32.5° | 15609.9 | 13857.5 | 9834.3  | 6057.2 | 3801.9 | 2216.3 | 1477.9 | 1158.4 | 990.4  | 906.4  | 919.4  |
| 35°   | 16982.5 | 14830.1 | 10280.4 | 5799.3 | 3017.4 | 1602.2 | 1044.8 | 868.5  | 798.7  | 754.9  | 757.3  |
| 37.5° | 18465.2 | 15899.8 | 10647.2 | 5453.8 | 2281.4 | 1100.5 | 771.5  | 744.3  | 714.7  | 659.1  | 654.4  |
| 40°   | 20014.1 | 17138.7 | 10866.1 | 4895.3 | 1585.6 | 762.0  | 655.5  | 686.3  | 669.7  | 597.6  | 591.6  |
| 42.5° | 21327.5 | 18094.8 | 10920.5 | 4155.7 | 1025.9 | 617.7  | 594.0  | 641.3  | 644.9  | 571.5  | 562.1  |
| 45°   | 22588.9 | 18946.8 | 10814.0 | 3181.9 | 711.2  | 581.0  | 556.1  | 621.2  | 626.0  | 559.7  | 544.3  |
| 47.5° | 24000.6 | 20112.3 | 10621.2 | 2122.8 | 588.1  | 549.0  | 543.1  | 588.1  | 604.7  | 550.2  | 531.3  |
| 50°   | 25715.2 | 21060.1 | 10049.6 | 1304.0 | 555.0  | 528.9  | 528.9  | 556.1  | 578.6  | 531.3  | 521.8  |
| 52.5° | 27473.5 | 21886.1 | 9203.6  | 894.6  | 534.8  | 507.6  | 523.0  | 534.8  | 543.1  | 500.5  | 508.8  |
| 55°   | 28733.7 | 22618.5 | 7942.2  | 719.4  | 523.0  | 493.4  | 530.1  | 506.4  | 494.6  | 457.9  | 449.6  |
| 57.5° | 30132.4 | 23489.4 | 6652.4  | 637.8  | 507.6  | 501.7  | 506.4  | 461.5  | 428.3  | 390.5  | 382.2  |
| 60°   | 31108.6 | 23958.0 | 5073.9  | 599.9  | 489.9  | 493.4  | 467.4  | 407.1  | 346.7  | 319.5  | 313.6  |
| 62.5° | 31960.5 | 24225.4 | 3719.1  | 551.4  | 473.3  | 472.1  | 423.6  | 347.9  | 285.2  | 255.6  | 250.9  |
| 65°   | 31831.6 | 23807.7 | 2410.4  | 512.4  | 460.3  | 444.9  | 379.8  | 298.2  | 237.8  | 215.4  | 213.0  |
| 67.5° | 30412.8 | 21959.4 | 1518.2  | 472.1  | 437.8  | 410.6  | 340.8  | 266.2  | 218.9  | 192.9  | 190.5  |
| 70°   | 27434.5 | 19407.1 | 928.9   | 420.1  | 389.3  | 363.3  | 301.7  | 249.7  | 207.1  | 176.3  | 170.4  |
| 72.5° | 23317.8 | 16621.6 | 656.7   | 370.4  | 339.6  | 308.8  | 255.6  | 237.8  | 197.6  | 158.6  | 153.8  |
| 75°   | 19157.4 | 12243.5 | 550.2   | 323.0  | 289.9  | 248.5  | 217.7  | 221.3  | 185.8  | 144.4  | 140.8  |
| 77.5° | 13490.6 | 7633.4  | 512.4   | 263.9  | 228.4  | 197.6  | 188.1  | 202.3  | 170.4  | 132.5  | 129.0  |
| 80°   | 7873.6  | 4287.0  | 423.6   | 208.3  | 171.6  | 152.6  | 157.4  | 171.6  | 149.1  | 119.5  | 114.8  |
| 82.5° | 3178.3  | 1696.8  | 298.2   | 162.1  | 125.4  | 121.9  | 129.0  | 139.6  | 123.1  | 100.6  | 98.2   |
| 85°   | 1134.8  | 530.1   | 169.2   | 106.5  | 80.5   | 84.0   | 82.8   | 99.4   | 88.7   | 73.4   | 72.2   |
| 87.5° | 298.2   | 105.3   | 75.7    | 42.6   | 34.3   | 34.3   | 31.9   | 46.1   | 42.6   | 33.1   | 36.7   |
| 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: SP1-2104-215-4

Luminaire Tested: CST-CA10-630-722-U-T3

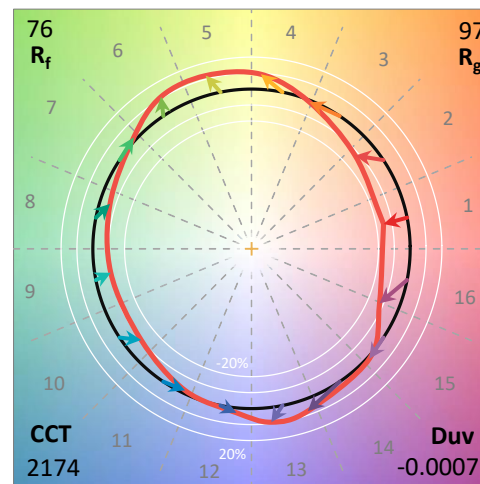
Test Date: 04/20/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/20/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA10-630-722-U-T3**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2174    | CRI (Ra): | 72.8 |      |       |
| CIE u':                   | 0.2919  | R1:       | 70.2 | R9:  | -23.3 |
| CIE v':                   | 0.5354  | R2:       | 86.8 | R10: | 71.8  |
| Duv:                      | -0.0007 | R3:       | 92.8 | R11: | 63.6  |
| CIE x:                    | 0.5067  | R4:       | 66.8 | R12: | 66.0  |
| CIE y:                    | 0.4131  | R5:       | 69.1 | R13: | 73.5  |
| CIE z:                    | 0.0802  | R6:       | 84.7 | R14: | 96.9  |
| Peak Wavelength (nm):     | 608     | R7:       | 73.2 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 39.0 |      |       |
| Purity:                   | 76.7    |           |      |      |       |
| Rf:                       | 75.7    |           |      |      |       |
| Rg:                       | 96.7    |           |      |      |       |



### Test Conditions

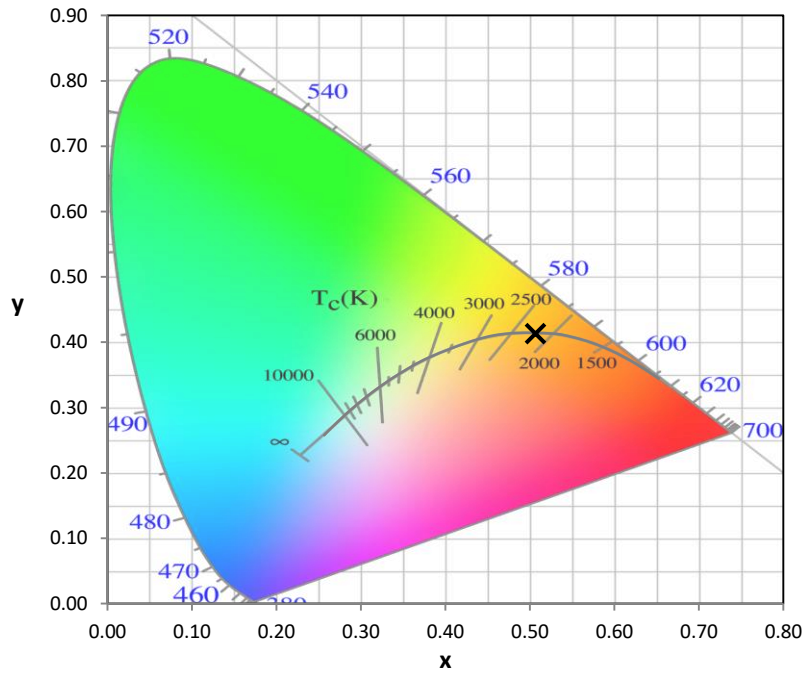
Stabilization Time: 79M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/32%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2104-215-4

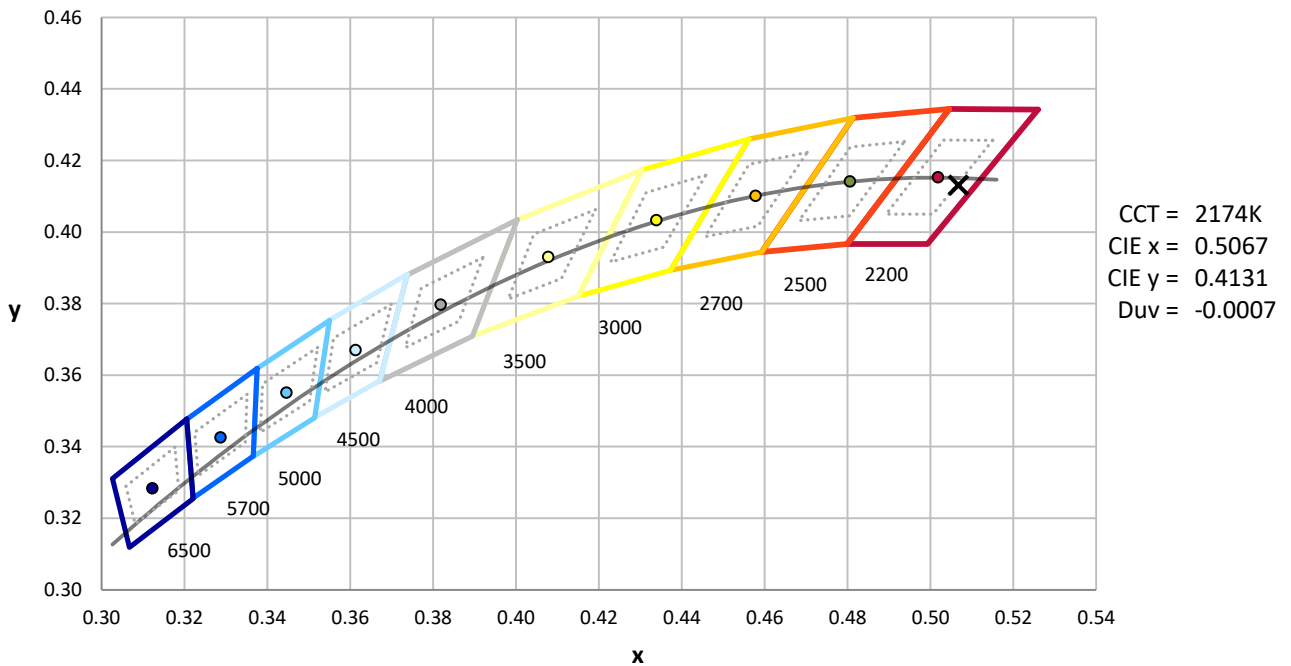
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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: SP1-2104-215-4

**CIE 1931 Chromaticity Diagram**



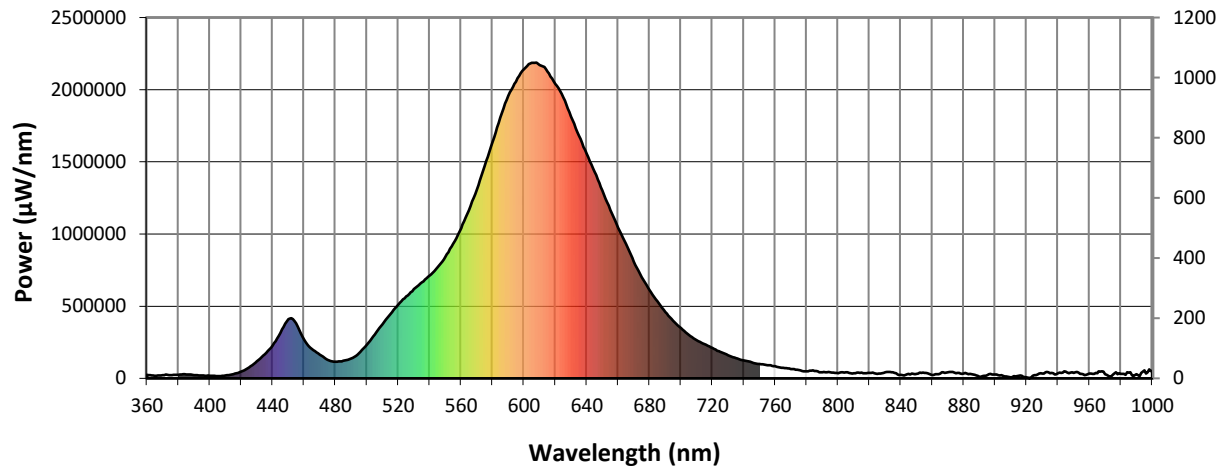
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2200K 7-step quadrangle

REPORT NUMBER: SP1-2104-215-4

### Photopic Flux vs. Wavelength

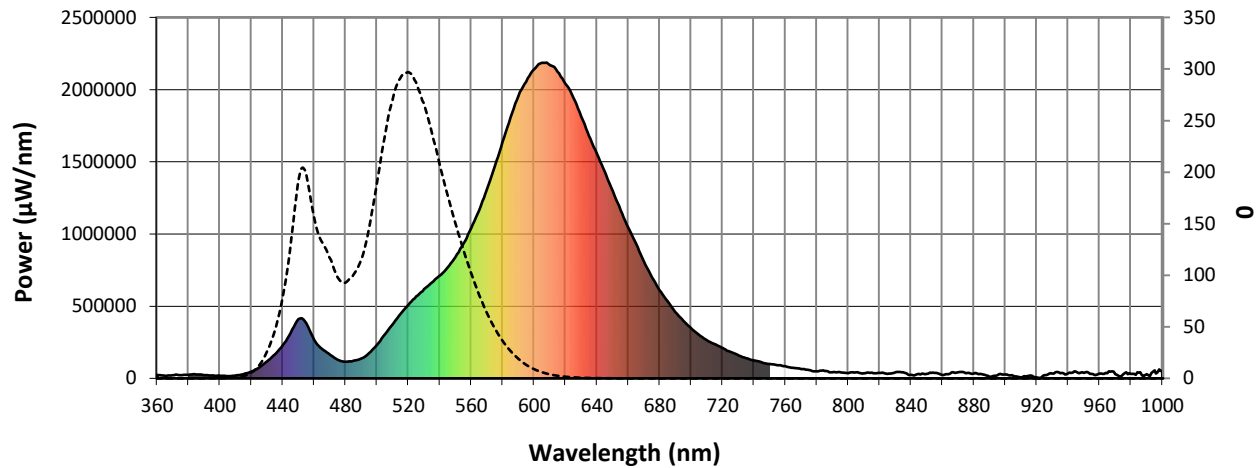


#####

| 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       | 23398            | 0.0              | 490       | 137099           | 19.5             | 620       | 2038916          | 530.6            | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 31.6             | 625       | 1946743          | 429.5            | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 51.3             | 630       | 1814508          | 328.4            | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 84.9             | 635       | 1681061          | 252.6            | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 128.6            | 640       | 1557170          | 186.1            | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.0              | 515       | 445274           | 184.5            | 645       | 1430182          | 137.7            | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.0              | 520       | 510296           | 247.5            | 650       | 1300435          | 95.0             | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.0              | 525       | 566771           | 304.3            | 655       | 1165554          | 66.9             | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.0              | 530       | 617892           | 363.8            | 660       | 1044122          | 43.5             | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.0              | 535       | 664903           | 412.3            | 665       | 932131           | 29.6             | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 0.0              | 540       | 711603           | 463.7            | 670       | 808971           | 17.7             | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 0.1              | 545       | 768835           | 511.7            | 675       | 701208           | 11.7             | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 0.1              | 550       | 841179           | 571.6            | 680       | 610741           | 7.1              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 0.4              | 555       | 932641           | 637.0            | 685       | 533825           | 4.6              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 0.9              | 560       | 1040487          | 707.1            | 690       | 459427           | 2.6              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 2.0              | 565       | 1164360          | 774.2            | 695       | 399973           | 1.7              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 3.6              | 570       | 1307677          | 850.3            | 700       | 347460           | 1.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 6.6              | 575       | 1470810          | 915.2            | 705       | 302187           | 0.6              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 10.6             | 580       | 1637734          | 973.2            | 710       | 262909           | 0.4              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 12.8             | 585       | 1807622          | 1004.4           | 715       | 236689           | 0.3              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 11.0             | 590       | 1958195          | 1012.4           | 720       | 209675           | 0.1              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 10.5             | 595       | 2055425          | 974.3            | 725       | 184999           | 0.1              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 10.2             | 600       | 2141598          | 923.0            | 730       | 160261           | 0.1              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 10.1             | 605       | 2185430          | 846.3            | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 11.0             | 610       | 2170089          | 745.5            | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 14.3             | 615       | 2123505          | 641.1            | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-4

### Scotopic Flux vs. Wavelength



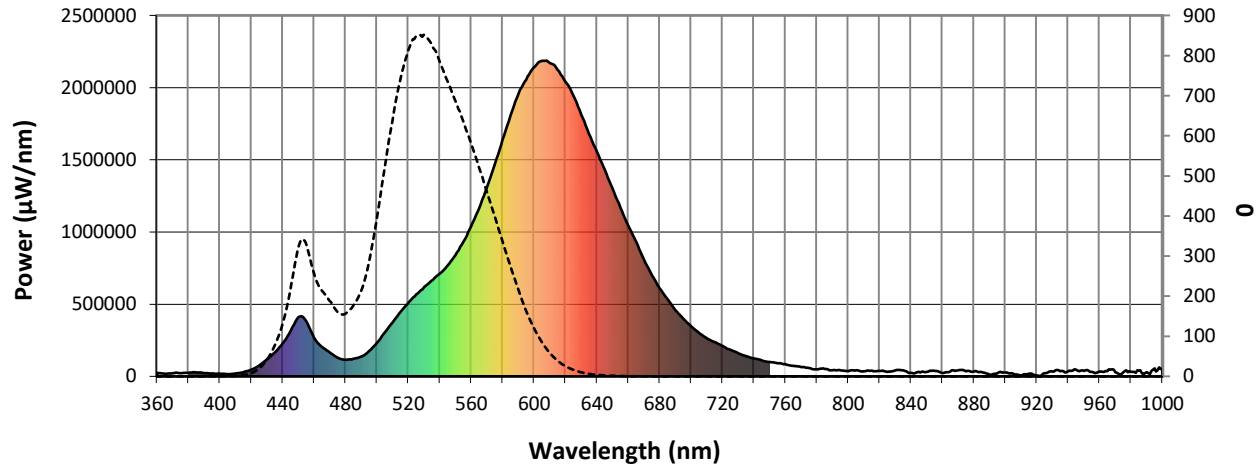
Scotopic Lumens: 72942.9

S/P: 0.88

| 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       | 23398            | 0.0              | 490       | 137099           | 211.1            | 620       | 2038916          | 25.5             | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 281.7            | 625       | 1946743          | 16.4             | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 389.3            | 630       | 1814508          | 10.3             | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 516.0            | 635       | 1681061          | 6.4              | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 634.7            | 640       | 1557170          | 4.0              | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.1              | 515       | 445274           | 738.0            | 645       | 1430182          | 2.4              | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.1              | 520       | 510296           | 811.1            | 650       | 1300435          | 1.5              | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.2              | 525       | 566771           | 847.9            | 655       | 1165554          | 0.9              | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.3              | 530       | 617892           | 851.9            | 660       | 1044122          | 0.6              | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.5              | 535       | 664903           | 828.5            | 665       | 932131           | 0.3              | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 1.2              | 540       | 711603           | 786.3            | 670       | 808971           | 0.2              | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 3.0              | 545       | 768835           | 737.2            | 675       | 701208           | 0.1              | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 7.6              | 550       | 841179           | 687.8            | 680       | 610741           | 0.1              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 18.7             | 555       | 932641           | 637.4            | 685       | 533825           | 0.0              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 40.1             | 560       | 1040487          | 581.6            | 690       | 459427           | 0.0              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 74.6             | 565       | 1164360          | 522.4            | 695       | 399973           | 0.0              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 127.3            | 570       | 1307677          | 461.5            | 700       | 347460           | 0.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 211.2            | 575       | 1470810          | 400.6            | 705       | 302187           | 0.0              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 317.4            | 580       | 1637734          | 337.4            | 710       | 262909           | 0.0              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 333.0            | 585       | 1807622          | 276.3            | 715       | 236689           | 0.0              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 260.0            | 590       | 1958195          | 218.0            | 720       | 209675           | 0.0              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 214.9            | 595       | 2055425          | 163.9            | 725       | 184999           | 0.0              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 188.8            | 600       | 2141598          | 120.7            | 730       | 160261           | 0.0              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 161.5            | 605       | 2185430          | 85.9             | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 155.9            | 610       | 2170089          | 58.8             | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 175.3            | 615       | 2123505          | 39.3             | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-4

### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 23955.7**      **M/P: 0.29**

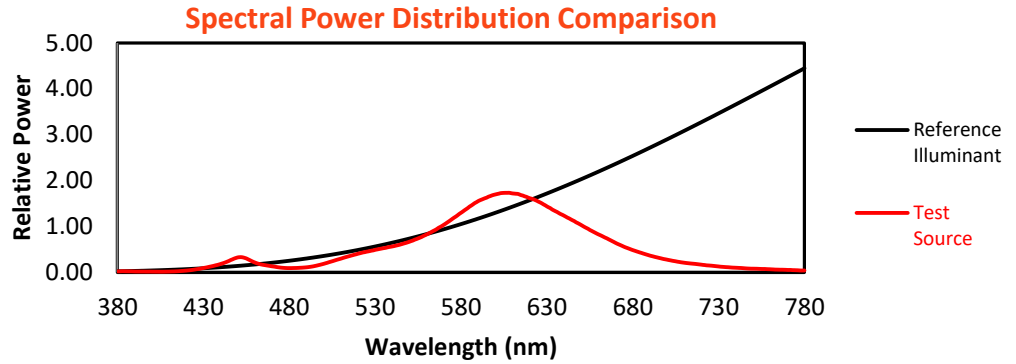
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 23398            | 0.0              | 490       | 137099           | 114.1            | 620       | 2038916          | 1.6              | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 143.9            | 625       | 1946743          | 1.0              | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 187.1            | 630       | 1814508          | 0.6              | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 232.9            | 635       | 1681061          | 0.4              | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 268.9            | 640       | 1557170          | 0.2              | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.0              | 515       | 445274           | 290.9            | 645       | 1430182          | 0.2              | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.1              | 520       | 510296           | 297.1            | 650       | 1300435          | 0.1              | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.1              | 525       | 566771           | 287.4            | 655       | 1165554          | 0.1              | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.2              | 530       | 617892           | 267.0            | 660       | 1044122          | 0.0              | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.3              | 535       | 664903           | 239.3            | 665       | 932131           | 0.0              | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 0.8              | 540       | 711603           | 208.3            | 670       | 808971           | 0.0              | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 1.9              | 545       | 768835           | 178.6            | 675       | 701208           | 0.0              | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 5.3              | 550       | 841179           | 151.0            | 680       | 610741           | 0.0              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 11.9             | 555       | 932641           | 125.8            | 685       | 533825           | 0.0              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 24.9             | 560       | 1040487          | 102.6            | 690       | 459427           | 0.0              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 44.5             | 565       | 1164360          | 81.7             | 695       | 399973           | 0.0              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 76.1             | 570       | 1307677          | 63.9             | 700       | 347460           | 0.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 124.4            | 575       | 1470810          | 49.0             | 705       | 302187           | 0.0              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 188.7            | 580       | 1637734          | 36.6             | 710       | 262909           | 0.0              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 199.7            | 585       | 1807622          | 26.9             | 715       | 236689           | 0.0              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 158.6            | 590       | 1958195          | 19.2             | 720       | 209675           | 0.0              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 133.0            | 595       | 2055425          | 13.2             | 725       | 184999           | 0.0              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 117.4            | 600       | 2141598          | 9.0              | 730       | 160261           | 0.0              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 98.6             | 605       | 2185430          | 6.0              | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 92.8             | 610       | 2170089          | 3.9              | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 99.7             | 615       | 2123505          | 2.5              | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-4

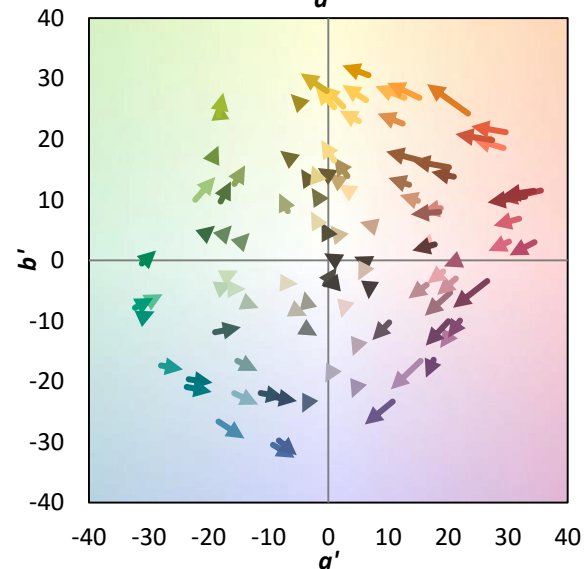
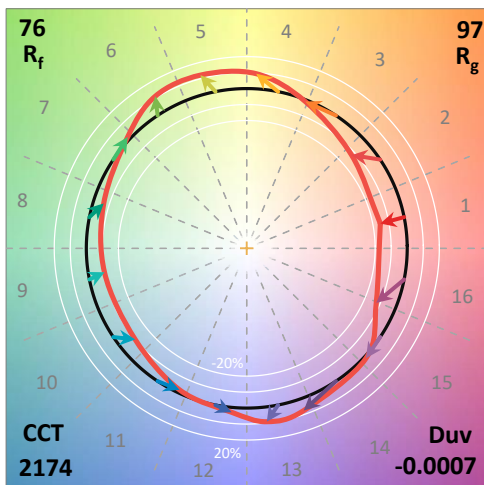
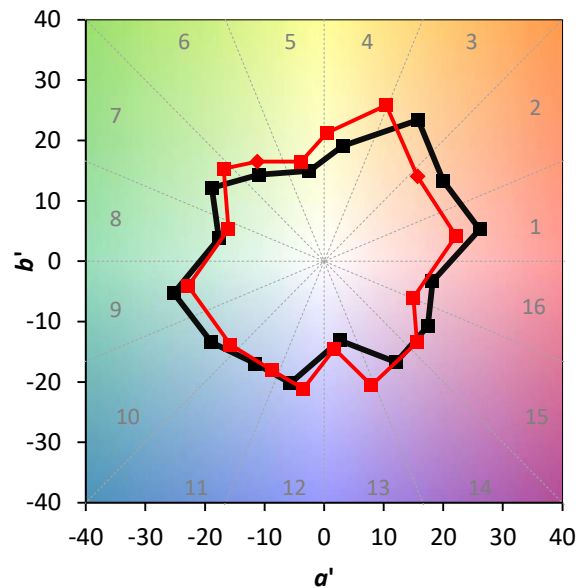
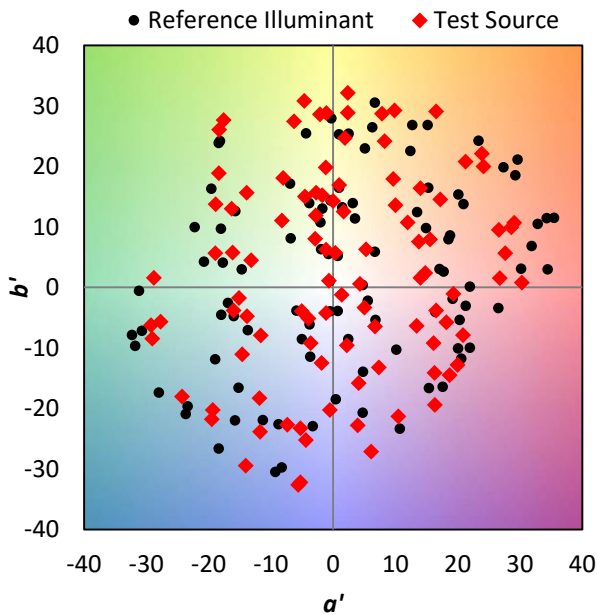
TM-30-18

### Summary

$R_f = 75.7$   
 $R_g = 96.7$   
 CIE  $R_a = 72.8$   
 $R_g = -23.3$



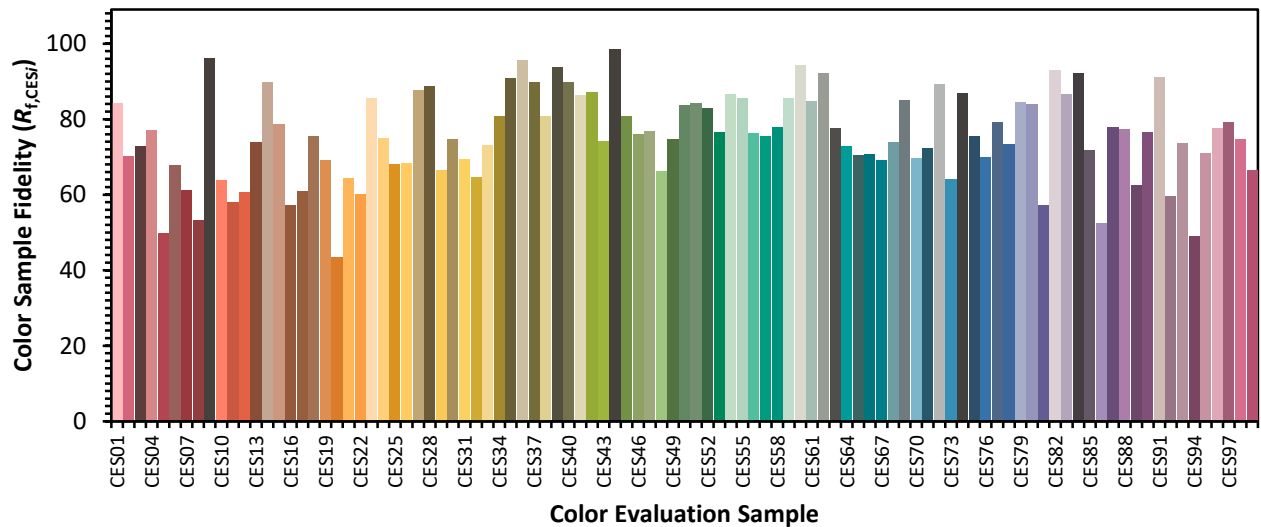
### Color Vector Graphics

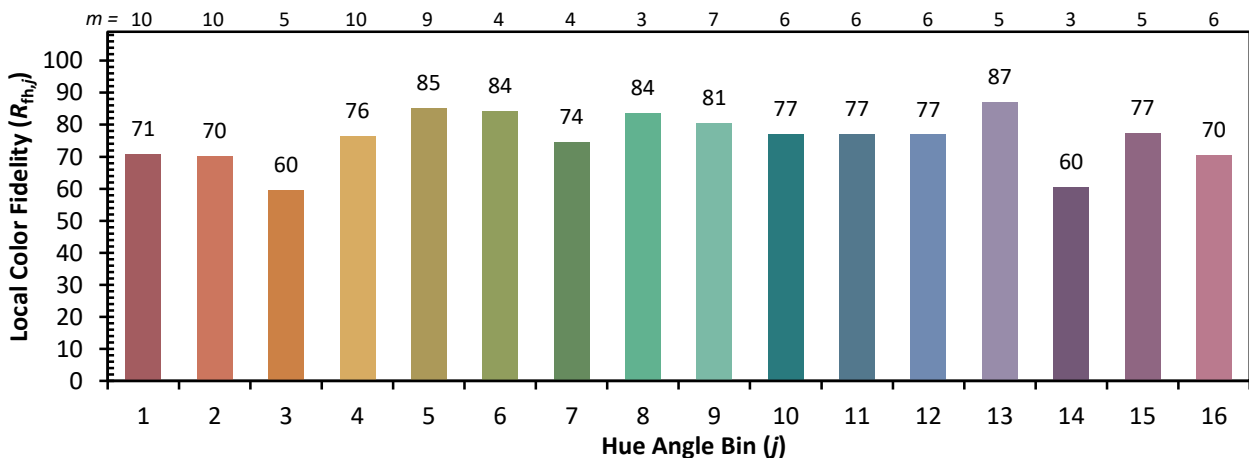
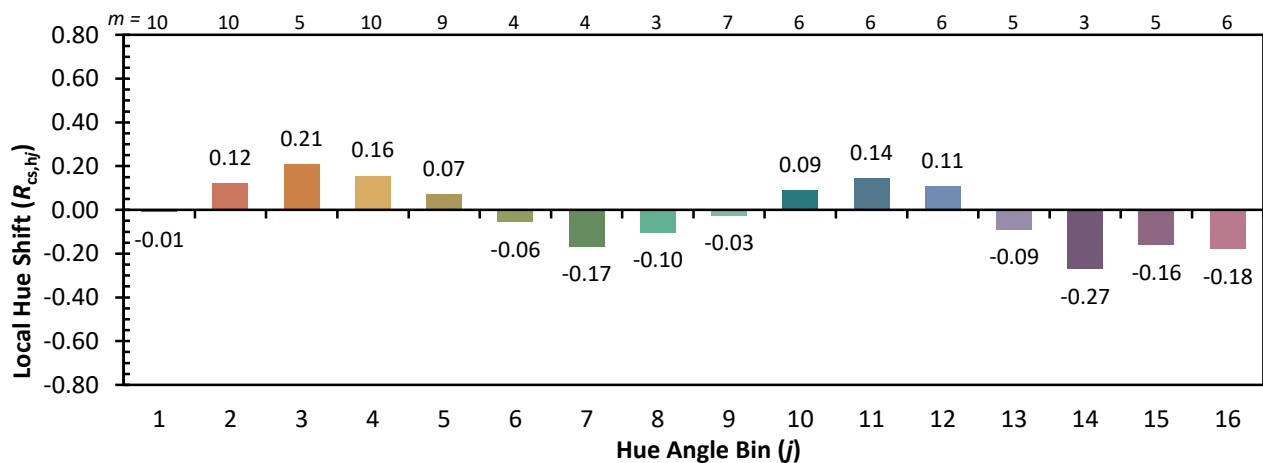
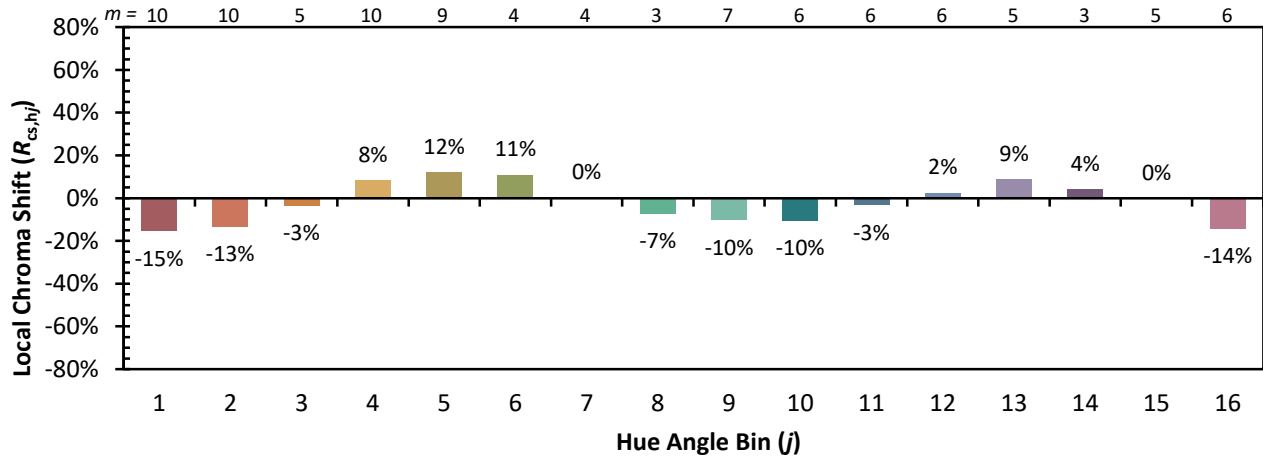


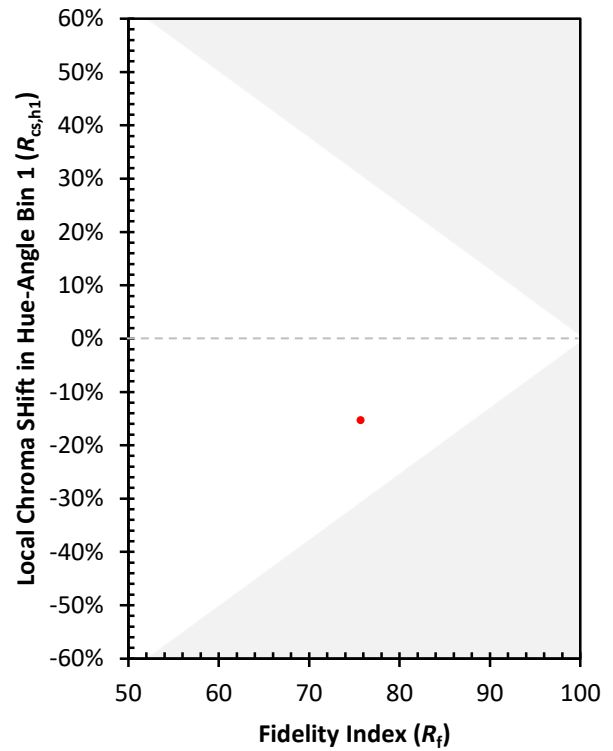
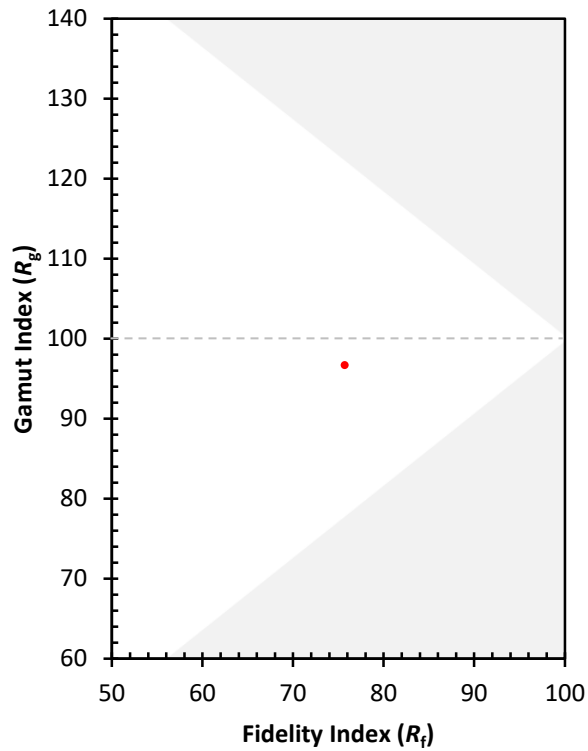


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 68 | CES51 = 84 | CES76 = 70 |
| CES02 = 65 | CES27 = 88 | CES52 = 83 | CES77 = 79 |
| CES03 = 32 | CES28 = 89 | CES53 = 77 | CES78 = 73 |
| CES04 = 72 | CES29 = 66 | CES54 = 87 | CES79 = 85 |
| CES05 = 52 | CES30 = 75 | CES55 = 85 | CES80 = 84 |
| CES06 = 53 | CES31 = 69 | CES56 = 76 | CES81 = 57 |
| CES07 = 44 | CES32 = 65 | CES57 = 75 | CES82 = 93 |
| CES08 = 43 | CES33 = 73 | CES58 = 78 | CES83 = 87 |
| CES09 = 29 | CES34 = 81 | CES59 = 86 | CES84 = 92 |
| CES10 = 79 | CES35 = 91 | CES60 = 94 | CES85 = 72 |
| CES11 = 62 | CES36 = 96 | CES61 = 85 | CES86 = 52 |
| CES12 = 68 | CES37 = 90 | CES62 = 92 | CES87 = 78 |
| CES13 = 45 | CES38 = 81 | CES63 = 78 | CES88 = 77 |
| CES14 = 75 | CES39 = 94 | CES64 = 73 | CES89 = 62 |
| CES15 = 72 | CES40 = 90 | CES65 = 71 | CES90 = 77 |
| CES16 = 49 | CES41 = 86 | CES66 = 71 | CES91 = 91 |
| CES17 = 51 | CES42 = 87 | CES67 = 69 | CES92 = 60 |
| CES18 = 57 | CES43 = 74 | CES68 = 74 | CES93 = 74 |
| CES19 = 74 | CES44 = 99 | CES69 = 85 | CES94 = 49 |
| CES20 = 69 | CES45 = 81 | CES70 = 70 | CES95 = 71 |
| CES21 = 89 | CES46 = 76 | CES71 = 72 | CES96 = 77 |
| CES22 = 81 | CES47 = 77 | CES72 = 89 | CES97 = 79 |
| CES23 = 92 | CES48 = 66 | CES73 = 64 | CES98 = 75 |
| CES24 = 92 | CES49 = 75 | CES74 = 87 | CES99 = 67 |
| CES25 = 74 | CES50 = 84 | CES75 = 75 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**


(END OF REPORT)