

Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P632805

Luminaire Tested: GWS-SA2D-740-U-SL2-W-GRSWH

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P632805  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-29)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA2D-740-U-SL2-W-GRSWH  
Description: GALLEON WALL SLIM LUMINAIRE. (2) LIGHTSQUARES WITH 16 LEDS EACH AND  
TYPE II SPILL LIGHT ELIMINATOR OPTICS W/ FACTORY INSTALLED GLARE SHIELD,  
WH  
Light Source: (32) 4000K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 9944.7 lumens  
Efficiency: N/A  
Efficacy: 121.1 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2

Input Watts (W): 82.1  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



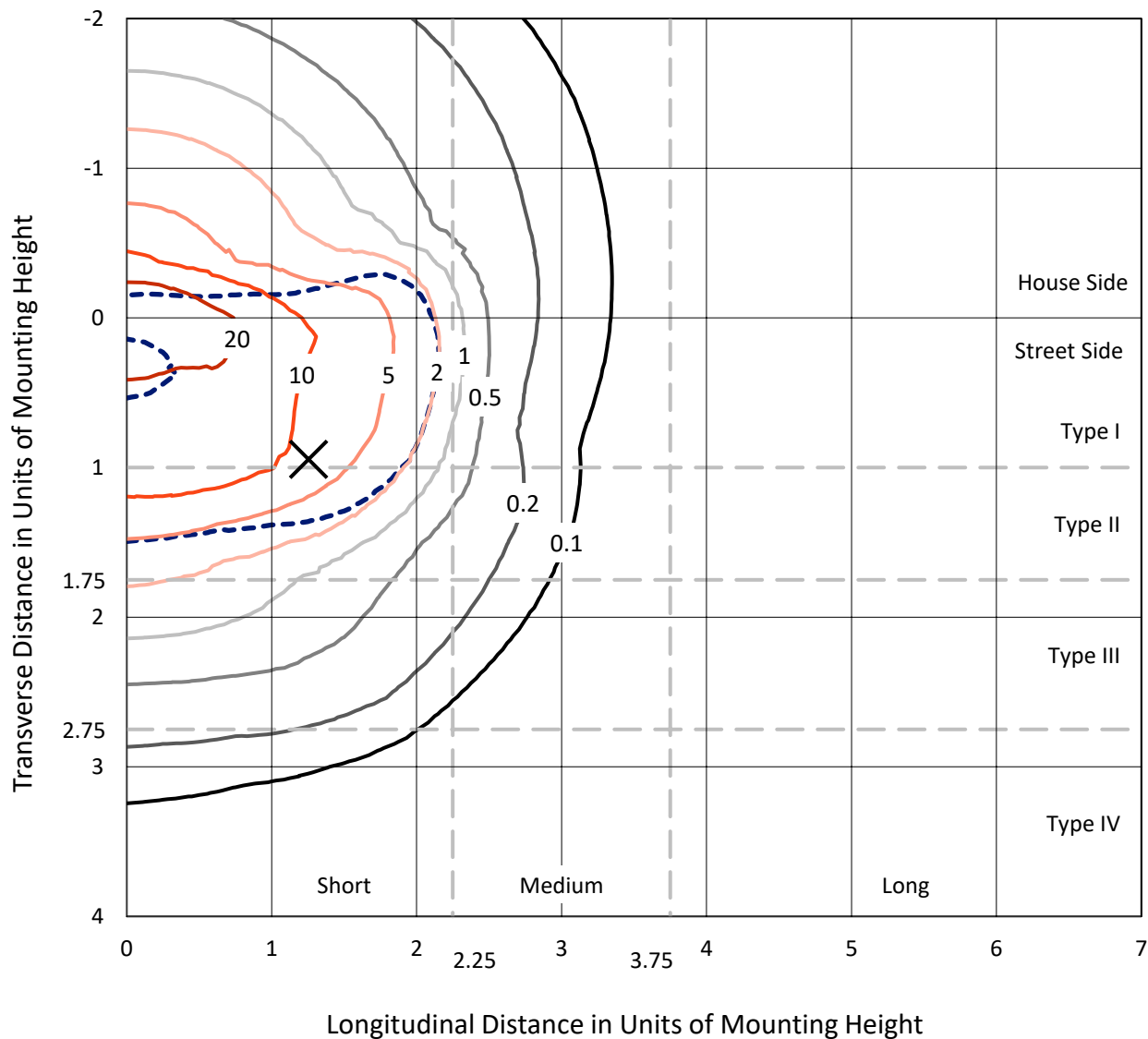
REPORT NUMBER: P632805

CATALOG NUMBER: GWS-SA2D-740-U-SL2-W-GRSWH

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

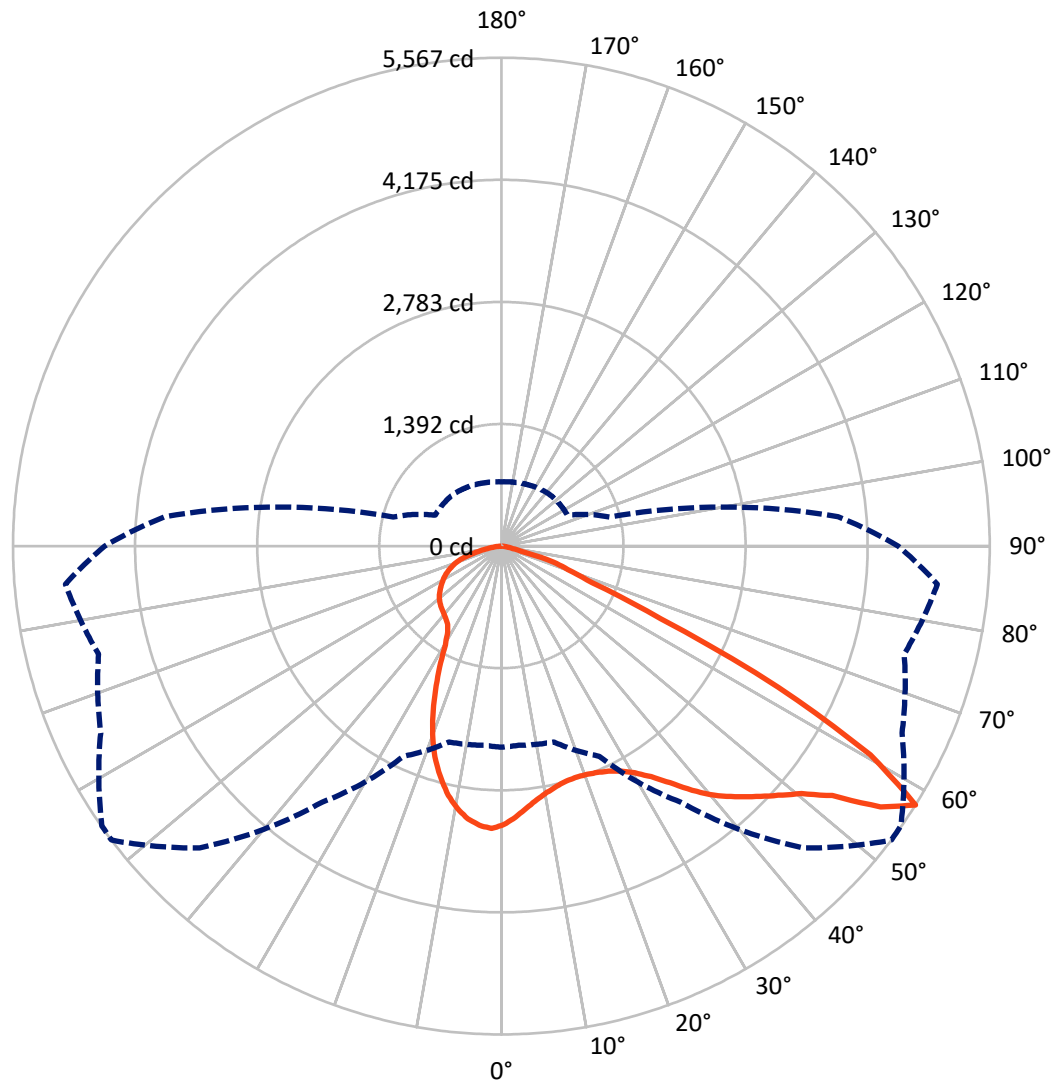


Based on 10 foot mounting height. Maximum calculated value = 31.8 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 53-Deg Lateral    - - - Horizontal Cone Through 57.5-Deg Vertical

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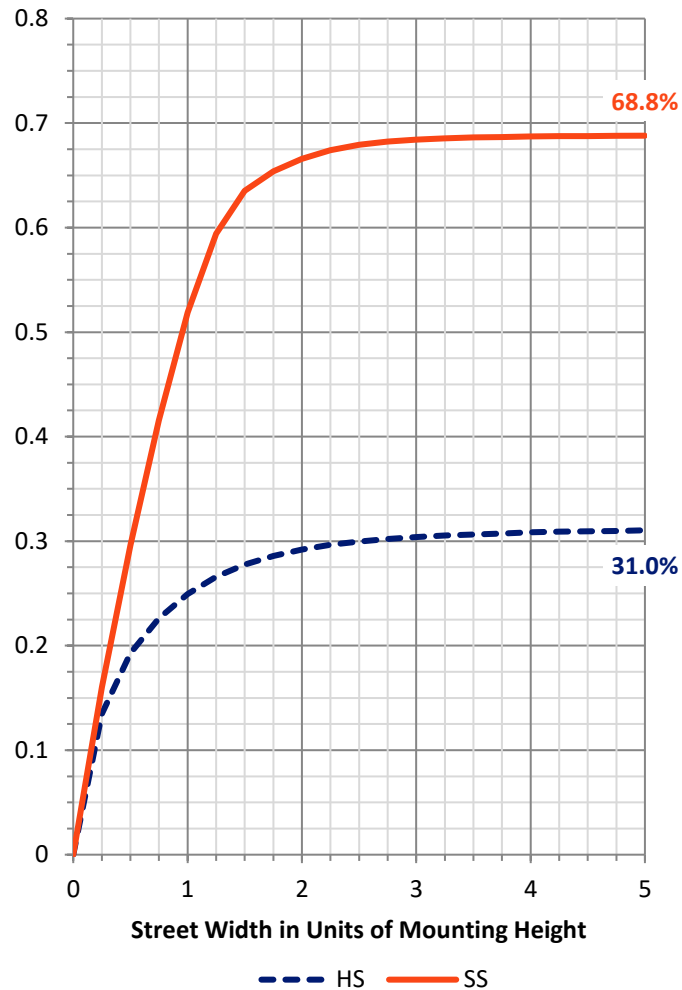
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 3109.3   | 0.0    | 3109.3 |
|                    | % Fixture | 31.3     | 0.0    | 31.3   |
| <b>Street Side</b> | Lumens    | 6835.4   | 0.0    | 6835.4 |
|                    | % Fixture | 68.7     | 0.0    | 68.7   |
| <b>Total</b>       | Lumens    | 9944.7   | 0.0    | 9944.7 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 287.2  | 2.9       |
| 10°-20°   | 753.4  | 7.6       |
| 20°-30°   | 1110.0 | 11.2      |
| 30°-40°   | 1553.7 | 15.6      |
| 40°-50°   | 2042.5 | 20.5      |
| 50°-60°   | 2394.8 | 24.1      |
| 60°-70°   | 1410.8 | 14.2      |
| 70°-80°   | 351.0  | 3.5       |
| 80°-90°   | 41.2   | 0.4       |
| 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°    | 9944.7 | 100.0     |
| 0°-180°   | 9944.7 | 100.0     |

**Coefficient of Utilization**



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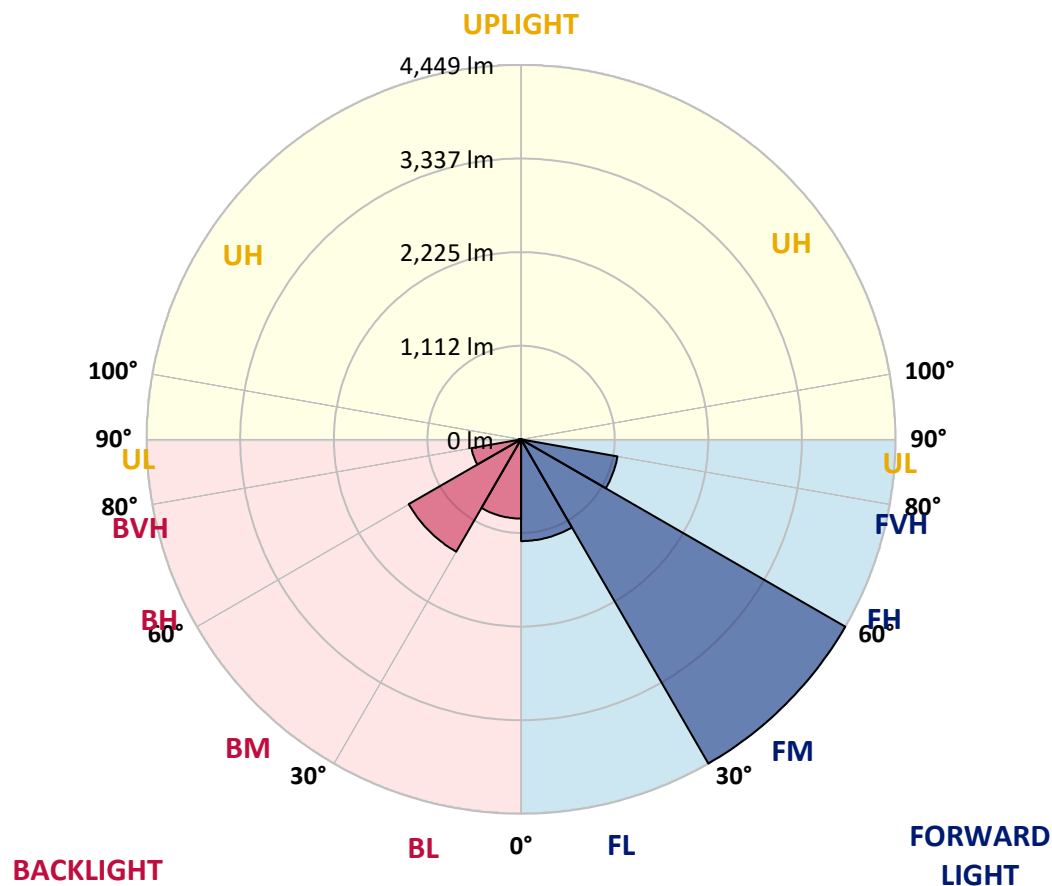
CATALOG NUMBER: GWS-SA2D-740-U-SL2-W-GRSWH

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1209.1 | 12.2      |                         |      |         |
| FM   | (30°-60°)   | 4449.3 | 44.7      |                         |      |         |
| FH   | (60°-80°)   | 1163.2 | 11.7      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 13.8   | 0.1       |                         |      | G1/100  |
| BL   | (0°-30°)    | 941.5  | 9.5       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1541.8 | 15.5      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 598.7  | 6.0       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 27.4   | 0.3       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 53°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 |
| 2.5°  | 2993.1 | 3001.5 | 3003.2 | 3029.1 | 3030.8 | 3068.5 | 3093.6 | 3088.6 | 3114.5 | 3146.3 | 3171.4 |
| 5°    | 2850.0 | 2850.9 | 2859.2 | 2890.2 | 2906.9 | 2956.3 | 2998.2 | 2998.2 | 3048.4 | 3113.7 | 3169.8 |
| 7.5°  | 2732.0 | 2731.2 | 2738.7 | 2773.0 | 2800.6 | 2860.1 | 2917.0 | 2923.7 | 2994.0 | 3089.4 | 3180.6 |
| 10°   | 2622.3 | 2628.2 | 2636.6 | 2678.4 | 2713.6 | 2787.2 | 2855.0 | 2865.9 | 2954.6 | 3072.7 | 3195.7 |
| 12.5° | 2552.0 | 2552.9 | 2565.4 | 2612.3 | 2657.5 | 2736.2 | 2807.3 | 2820.7 | 2922.8 | 3056.8 | 3206.6 |
| 15°   | 2506.8 | 2507.7 | 2521.1 | 2573.0 | 2625.7 | 2705.2 | 2778.0 | 2793.1 | 2904.4 | 3054.2 | 3227.5 |
| 17.5° | 2486.8 | 2485.9 | 2498.5 | 2550.4 | 2608.1 | 2691.0 | 2768.8 | 2787.2 | 2912.8 | 3073.5 | 3264.3 |
| 20°   | 2486.8 | 2487.6 | 2494.3 | 2541.2 | 2599.7 | 2687.6 | 2778.0 | 2800.6 | 2945.4 | 3117.0 | 3321.3 |
| 22.5° | 2521.9 | 2525.3 | 2528.6 | 2560.4 | 2606.4 | 2692.7 | 2802.3 | 2832.4 | 3015.7 | 3189.8 | 3395.7 |
| 25°   | 2590.5 | 2591.4 | 2594.7 | 2620.7 | 2641.6 | 2706.9 | 2842.5 | 2887.7 | 3125.4 | 3296.1 | 3489.5 |
| 27.5° | 2682.6 | 2694.3 | 2697.7 | 2714.4 | 2714.4 | 2742.0 | 2905.3 | 2970.5 | 3273.5 | 3449.3 | 3609.2 |
| 30°   | 2811.5 | 2815.7 | 2821.6 | 2840.0 | 2819.9 | 2808.2 | 2997.3 | 3081.0 | 3445.1 | 3634.3 | 3753.1 |
| 32.5° | 2924.5 | 2933.7 | 2965.5 | 2995.7 | 2959.7 | 2922.8 | 3132.9 | 3231.7 | 3610.0 | 3826.8 | 3906.3 |
| 35°   | 3020.8 | 3043.4 | 3104.5 | 3171.4 | 3146.3 | 3109.5 | 3312.9 | 3415.8 | 3745.6 | 3964.9 | 4041.9 |
| 37.5° | 3137.1 | 3154.7 | 3238.4 | 3347.2 | 3369.8 | 3352.2 | 3532.2 | 3605.8 | 3836.0 | 4000.1 | 4115.6 |
| 40°   | 3255.1 | 3281.9 | 3389.9 | 3540.5 | 3626.8 | 3639.3 | 3734.7 | 3784.1 | 3867.0 | 3931.4 | 4101.3 |
| 42.5° | 3375.7 | 3421.7 | 3569.8 | 3745.6 | 3898.8 | 3927.2 | 3905.5 | 3926.4 | 3856.9 | 3836.8 | 4035.2 |
| 45°   | 3523.0 | 3577.4 | 3744.8 | 3969.1 | 4170.8 | 4215.2 | 4072.9 | 4053.6 | 3855.3 | 3800.9 | 3994.2 |
| 47.5° | 3697.1 | 3751.5 | 3911.3 | 4172.5 | 4430.3 | 4462.9 | 4244.5 | 4209.3 | 3913.9 | 3856.1 | 4049.4 |
| 50°   | 3851.1 | 3888.7 | 4031.9 | 4324.0 | 4672.2 | 4691.4 | 4433.6 | 4390.9 | 4059.5 | 4009.3 | 4221.9 |
| 52.5° | 3694.6 | 3690.4 | 3841.0 | 4200.9 | 4797.7 | 5029.6 | 4724.9 | 4683.9 | 4340.7 | 4263.7 | 4488.9 |
| 55°   | 3134.6 | 3086.9 | 3221.6 | 3575.7 | 4447.0 | 5330.1 | 5247.2 | 5165.2 | 4715.7 | 4519.8 | 4739.1 |
| 57.5° | 2291.7 | 2278.3 | 2311.0 | 2643.3 | 3562.3 | 4864.7 | 5566.9 | 5559.4 | 5039.6 | 4754.2 | 4988.6 |
| 60°   | 1792.0 | 1771.9 | 1684.9 | 1694.1 | 2428.2 | 3800.0 | 4831.2 | 5053.0 | 5240.5 | 4894.8 | 5162.7 |
| 62.5° | 1591.2 | 1576.1 | 1530.9 | 1406.2 | 1446.4 | 2547.9 | 3541.4 | 3744.8 | 4579.3 | 4323.2 | 4434.5 |
| 65°   | 1317.5 | 1313.3 | 1350.9 | 1345.9 | 1212.0 | 1407.0 | 1998.8 | 2203.8 | 2879.3 | 2915.3 | 2879.3 |
| 67.5° | 957.5  | 950.0  | 1045.4 | 1233.8 | 1166.8 | 1062.2 | 1114.1 | 1185.2 | 1476.5 | 1325.8 | 1193.6 |
| 70°   | 622.7  | 611.9  | 667.1  | 891.4  | 1044.6 | 925.7  | 802.7  | 791.0  | 811.9  | 504.7  | 545.7  |
| 72.5° | 417.7  | 405.1  | 404.3  | 490.5  | 631.1  | 623.6  | 621.9  | 616.0  | 549.9  | 398.4  | 441.9  |
| 75°   | 232.7  | 222.6  | 220.1  | 211.8  | 226.0  | 230.2  | 245.2  | 253.6  | 274.5  | 302.2  | 334.8  |
| 77.5° | 39.3   | 38.5   | 48.5   | 61.9   | 85.4   | 109.6  | 135.6  | 143.1  | 176.6  | 209.3  | 230.2  |
| 80°   | 21.8   | 22.6   | 29.3   | 36.0   | 47.7   | 65.3   | 83.7   | 88.7   | 108.8  | 126.4  | 143.1  |
| 82.5° | 11.7   | 11.7   | 15.1   | 19.3   | 25.9   | 34.3   | 45.2   | 49.4   | 62.8   | 73.7   | 85.4   |
| 85°   | 4.2    | 4.2    | 5.9    | 7.5    | 10.9   | 14.2   | 17.6   | 20.1   | 27.6   | 37.7   | 42.7   |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.8    | 1.7    | 3.3    | 3.3    | 4.2    | 7.5    | 10.9   |
| 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: P632805

CATALOG NUMBER: GWS-SA2D-740-U-SL2-W-GRSWH

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 | 3175.6 |
| 2.5°  | 3192.4 | 3169.8 | 3200.7 | 3215.0 | 3220.0 | 3223.3 | 3201.6 | 3186.5 | 3181.5 | 3165.6 | 3156.4 |
| 5°    | 3204.1 | 3189.0 | 3218.3 | 3218.3 | 3197.4 | 3175.6 | 3131.2 | 3100.3 | 3078.5 | 3052.6 | 3048.4 |
| 7.5°  | 3224.2 | 3213.3 | 3229.2 | 3196.5 | 3143.8 | 3085.2 | 3008.2 | 2947.9 | 2899.4 | 2867.6 | 2868.4 |
| 10°   | 3250.9 | 3237.6 | 3225.0 | 3152.2 | 3055.9 | 2947.9 | 2829.9 | 2742.0 | 2661.7 | 2624.9 | 2604.8 |
| 12.5° | 3268.5 | 3249.3 | 3196.5 | 3076.0 | 2934.6 | 2789.8 | 2623.2 | 2492.6 | 2376.3 | 2323.5 | 2319.4 |
| 15°   | 3290.3 | 3255.1 | 3149.7 | 2977.2 | 2780.5 | 2583.0 | 2368.7 | 2187.1 | 2029.7 | 1947.7 | 1943.5 |
| 17.5° | 3318.7 | 3261.0 | 3093.6 | 2864.2 | 2618.2 | 2326.9 | 2057.4 | 1828.9 | 1661.5 | 1597.8 | 1608.7 |
| 20°   | 3358.9 | 3267.7 | 3030.0 | 2738.7 | 2416.4 | 2035.6 | 1700.0 | 1489.9 | 1425.4 | 1421.2 | 1412.9 |
| 22.5° | 3404.1 | 3271.9 | 2959.7 | 2598.1 | 2172.0 | 1725.1 | 1404.5 | 1314.9 | 1314.1 | 1335.0 | 1340.1 |
| 25°   | 3455.2 | 3275.2 | 2880.1 | 2434.0 | 1907.5 | 1415.4 | 1242.1 | 1215.3 | 1236.3 | 1275.6 | 1280.6 |
| 27.5° | 3520.5 | 3281.9 | 2783.9 | 2254.1 | 1626.3 | 1222.9 | 1152.6 | 1145.9 | 1171.0 | 1207.8 | 1206.1 |
| 30°   | 3616.7 | 3306.2 | 2681.8 | 2047.3 | 1337.5 | 1131.6 | 1098.2 | 1099.0 | 1109.0 | 1126.6 | 1129.1 |
| 32.5° | 3714.6 | 3343.9 | 2582.2 | 1814.6 | 1171.8 | 1079.7 | 1064.7 | 1063.0 | 1063.0 | 1070.5 | 1072.2 |
| 35°   | 3807.6 | 3386.5 | 2474.2 | 1571.9 | 1091.5 | 1049.6 | 1039.6 | 1034.5 | 1032.0 | 1030.4 | 1027.8 |
| 37.5° | 3859.4 | 3407.5 | 2368.7 | 1332.5 | 1048.8 | 1029.5 | 1019.5 | 1012.8 | 1003.6 | 996.9  | 995.2  |
| 40°   | 3836.8 | 3383.2 | 2246.5 | 1153.4 | 1022.8 | 1010.3 | 998.6  | 989.3  | 976.8  | 970.9  | 967.6  |
| 42.5° | 3761.5 | 3307.9 | 2113.4 | 1068.9 | 1001.9 | 989.3  | 975.1  | 960.0  | 951.7  | 946.7  | 945.8  |
| 45°   | 3682.0 | 3216.6 | 1952.7 | 1019.5 | 981.8  | 966.7  | 950.0  | 933.3  | 924.1  | 921.5  | 920.7  |
| 47.5° | 3679.5 | 3171.4 | 1782.0 | 980.1  | 957.5  | 942.5  | 921.5  | 904.8  | 894.8  | 891.4  | 888.1  |
| 50°   | 3790.0 | 3217.5 | 1589.5 | 945.8  | 932.4  | 916.5  | 893.1  | 874.7  | 862.1  | 857.9  | 857.1  |
| 52.5° | 4019.3 | 3390.7 | 1417.1 | 911.5  | 898.9  | 880.5  | 861.3  | 842.9  | 827.8  | 820.3  | 819.4  |
| 55°   | 4267.1 | 3610.9 | 1309.9 | 876.3  | 859.6  | 843.7  | 826.1  | 806.0  | 789.3  | 777.6  | 775.9  |
| 57.5° | 4523.2 | 3851.1 | 1277.3 | 832.0  | 819.4  | 808.6  | 787.6  | 765.9  | 746.6  | 735.7  | 733.2  |
| 60°   | 4734.1 | 4057.8 | 1338.4 | 785.1  | 778.4  | 764.2  | 744.9  | 724.0  | 710.6  | 702.3  | 700.6  |
| 62.5° | 3963.2 | 3303.7 | 1080.6 | 734.1  | 734.1  | 719.0  | 697.2  | 682.2  | 673.0  | 667.1  | 665.4  |
| 65°   | 2515.2 | 2045.6 | 737.4  | 683.0  | 682.2  | 662.1  | 643.7  | 633.6  | 629.4  | 620.2  | 618.5  |
| 67.5° | 1095.6 | 934.9  | 630.3  | 631.1  | 627.8  | 606.0  | 587.6  | 580.0  | 571.7  | 561.6  | 560.8  |
| 70°   | 568.3  | 579.2  | 564.1  | 573.4  | 567.5  | 541.5  | 524.0  | 512.2  | 494.7  | 484.6  | 485.5  |
| 72.5° | 458.7  | 470.4  | 487.1  | 501.4  | 488.8  | 467.9  | 440.3  | 426.0  | 403.4  | 392.6  | 393.4  |
| 75°   | 349.9  | 362.4  | 378.3  | 393.4  | 383.4  | 357.4  | 339.8  | 325.6  | 299.6  | 287.1  | 289.6  |
| 77.5° | 241.1  | 247.8  | 267.0  | 266.2  | 262.8  | 255.3  | 229.3  | 212.6  | 185.8  | 170.7  | 172.4  |
| 80°   | 149.8  | 154.0  | 163.2  | 167.4  | 165.7  | 155.7  | 134.8  | 122.2  | 106.3  | 97.1   | 97.9   |
| 82.5° | 90.4   | 92.9   | 101.3  | 102.1  | 101.3  | 93.7   | 77.8   | 68.6   | 58.6   | 53.6   | 53.6   |
| 85°   | 46.0   | 47.7   | 52.7   | 52.7   | 47.7   | 40.2   | 36.0   | 31.8   | 25.9   | 23.4   | 23.4   |
| 87.5° | 12.6   | 12.6   | 15.9   | 13.4   | 10.9   | 10.0   | 5.0    | 4.2    | 1.7    | 0.8    | 0.8    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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

Report Prepared for

Cooper Lighting Solutions

MCGRAW, INVUE, LUMARK AND STREETWORKS

DATA VALID FOR LUMINAIRES UTILIZING SA LIGHT ENGINES

Report Number: SP1-2101-121-2

Luminaire Tested: IFLD-S-SA2A-740-U-T3R-HSS

Test Date: 03/05/2021

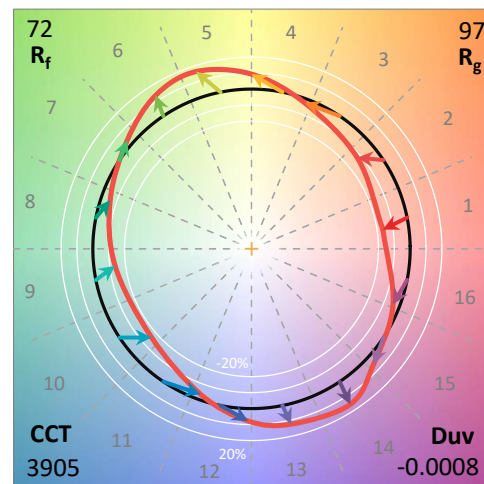
### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/05/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-740-U-T3R-HSS**  
 Description: STREETWORKS INF FLOOD

SHIELD, DRIVER PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 3905    | CRI (Ra): | 71.2 |      |       |
| CIE u':                   | 0.2273  | R1:       | 68.9 | R9:  | -29.7 |
| CIE v':                   | 0.5024  | R2:       | 77.0 | R10: | 46.2  |
| Duv:                      | -0.0008 | R3:       | 84.0 | R11: | 68.8  |
| CIE x:                    | 0.3841  | R4:       | 71.6 | R12: | 45.6  |
| CIE y:                    | 0.3774  | R5:       | 68.9 | R13: | 69.5  |
| CIE z:                    | 0.2385  | R6:       | 68.3 | R14: | 90.7  |
| Peak Wavelength (nm):     | 443     | R7:       | 78.7 |      |       |
| Dominant Wavelength (nm): | 579     | R8:       | 52.2 |      |       |
| Purity:                   | 28.7    |           |      |      |       |
| Rf:                       | 71.7    |           |      |      |       |
| Rg:                       | 96.9    |           |      |      |       |



### Test Conditions

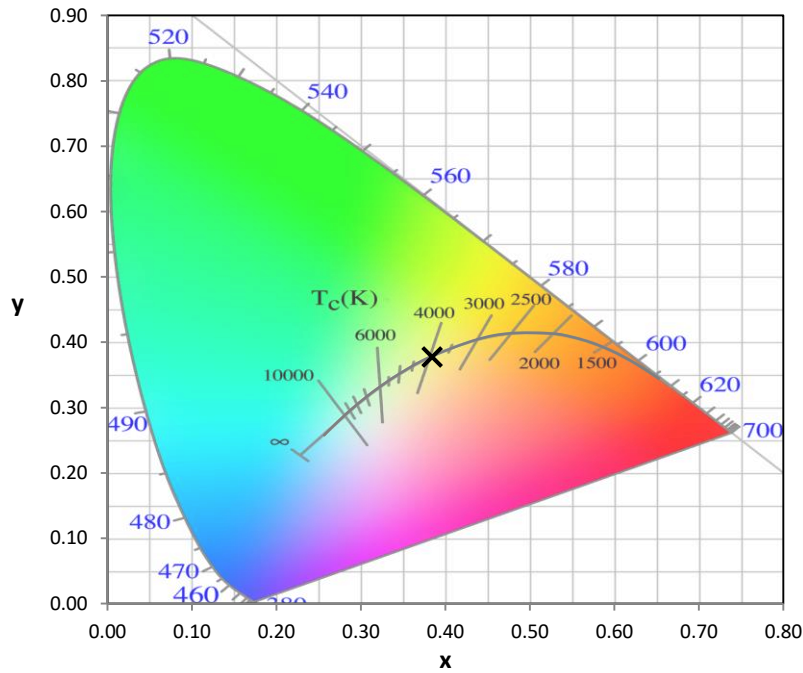
Stabilization Time: 211M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.8/312%  
 Sphere Temperature (°C): 24.1

REPORT NUMBER: SP1-2101-121-2

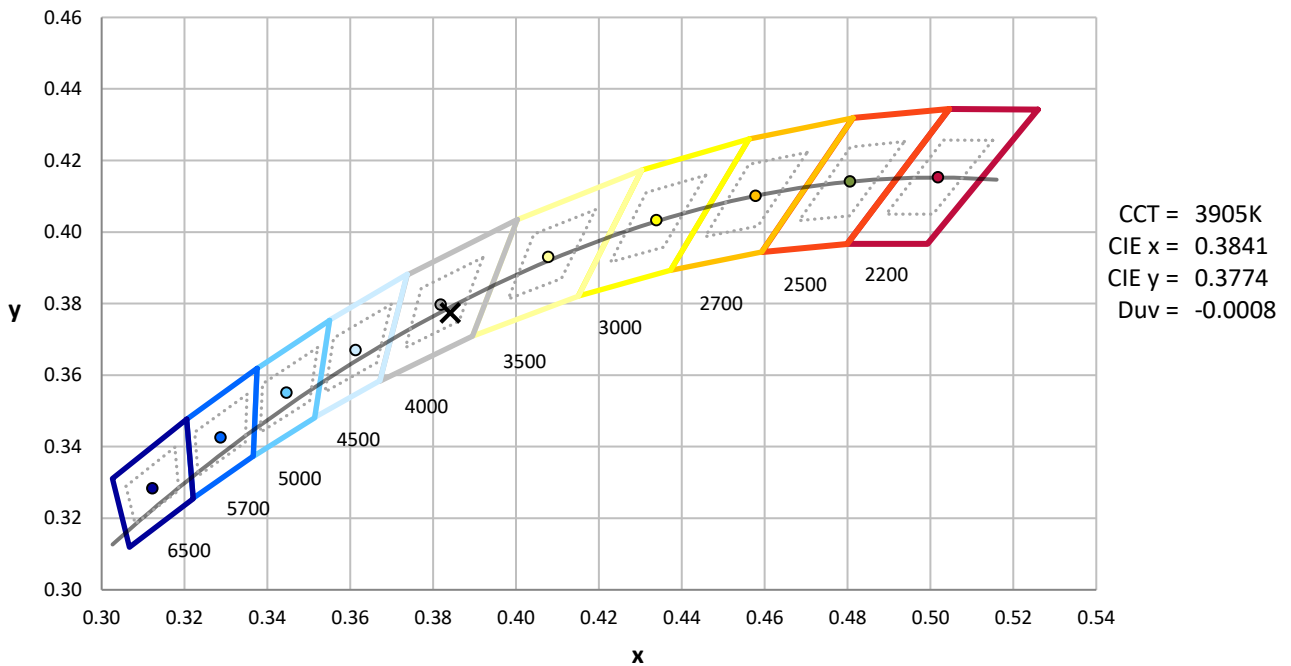
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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            |

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**CIE 1931 Chromaticity Diagram**



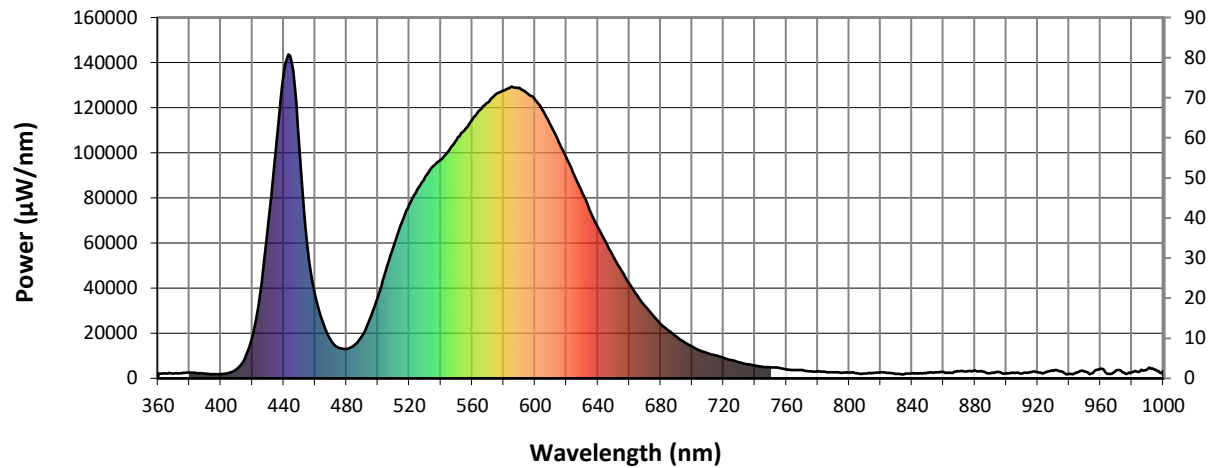
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 4000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

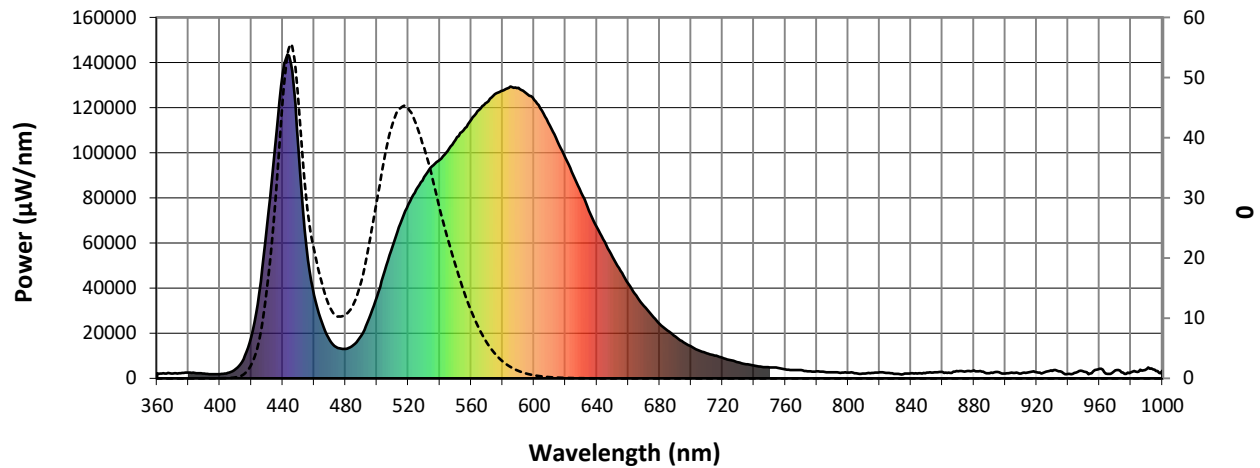


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2304             | 0.0              | 490       | 19043            | 2.7              | 620       | 97577            | 25.4             | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 4.8              | 625       | 90158            | 19.9             | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 8.0              | 630       | 82240            | 14.9             | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 13.3             | 635       | 74361            | 11.2             | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 20.2             | 640       | 66994            | 8.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 28.5             | 645       | 60405            | 5.8              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 37.4             | 650       | 53806            | 3.9              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 44.9             | 655       | 47610            | 2.7              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 52.6             | 660       | 42018            | 1.8              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 58.4             | 665       | 36742            | 1.2              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.0              | 540       | 96845            | 63.1             | 670       | 32105            | 0.7              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.0              | 545       | 100829           | 67.1             | 675       | 27946            | 0.5              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 0.1              | 550       | 105648           | 71.8             | 680       | 24146            | 0.3              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 0.2              | 555       | 110017           | 75.1             | 685       | 21191            | 0.2              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 0.5              | 560       | 114586           | 77.9             | 690       | 18544            | 0.1              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 1.2              | 565       | 118987           | 79.1             | 695       | 16058            | 0.1              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 2.1              | 570       | 122326           | 79.5             | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 2.9              | 575       | 125968           | 78.4             | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 2.7              | 580       | 127613           | 75.8             | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 2.0              | 585       | 129466           | 71.9             | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 1.5              | 590       | 128813           | 66.6             | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 1.3              | 595       | 126387           | 59.9             | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 1.0              | 600       | 123477           | 53.2             | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 1.1              | 605       | 118718           | 46.0             | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 1.2              | 610       | 112091           | 38.5             | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 1.7              | 615       | 105039           | 31.7             | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



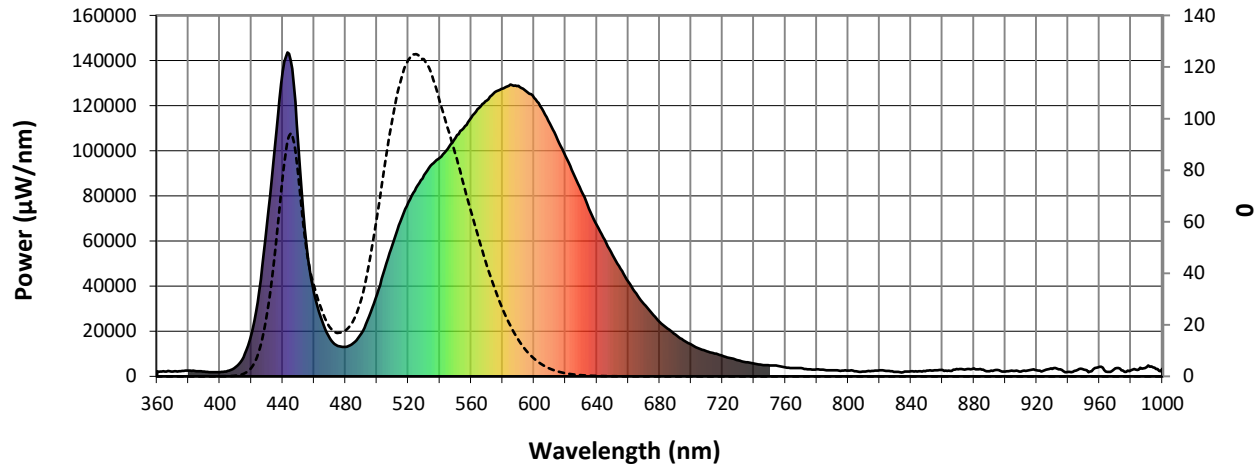
Scotopic Lumens: 10425.8

S/P: 1.47

| 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       | 2304             | 0.0              | 490       | 19043            | 29.3             | 620       | 97577            | 1.2              | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 43.0             | 625       | 90158            | 0.8              | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 60.8             | 630       | 82240            | 0.5              | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 81.1             | 635       | 74361            | 0.3              | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 99.6             | 640       | 66994            | 0.2              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 113.9            | 645       | 60405            | 0.1              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 122.6            | 650       | 53806            | 0.1              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 125.0            | 655       | 47610            | 0.0              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 123.1            | 660       | 42018            | 0.0              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.1              | 535       | 94097            | 117.3            | 665       | 36742            | 0.0              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.2              | 540       | 96845            | 107.0            | 670       | 32105            | 0.0              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.9              | 545       | 100829           | 96.7             | 675       | 27946            | 0.0              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 3.0              | 550       | 105648           | 86.4             | 680       | 24146            | 0.0              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 9.3              | 555       | 110017           | 75.2             | 685       | 21191            | 0.0              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 23.0             | 560       | 114586           | 64.0             | 690       | 18544            | 0.0              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 45.7             | 565       | 118987           | 53.4             | 695       | 16058            | 0.0              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 75.5             | 570       | 122326           | 43.2             | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 93.8             | 575       | 125968           | 34.3             | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 79.3             | 580       | 127613           | 26.3             | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 51.3             | 585       | 129466           | 19.8             | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 35.6             | 590       | 128813           | 14.3             | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 26.0             | 595       | 126387           | 10.1             | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 19.3             | 600       | 123477           | 7.0              | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 16.8             | 605       | 118718           | 4.7              | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 17.7             | 610       | 112091           | 3.0              | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 21.4             | 615       | 105039           | 1.9              | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: 3927.2

M/P: 0.55

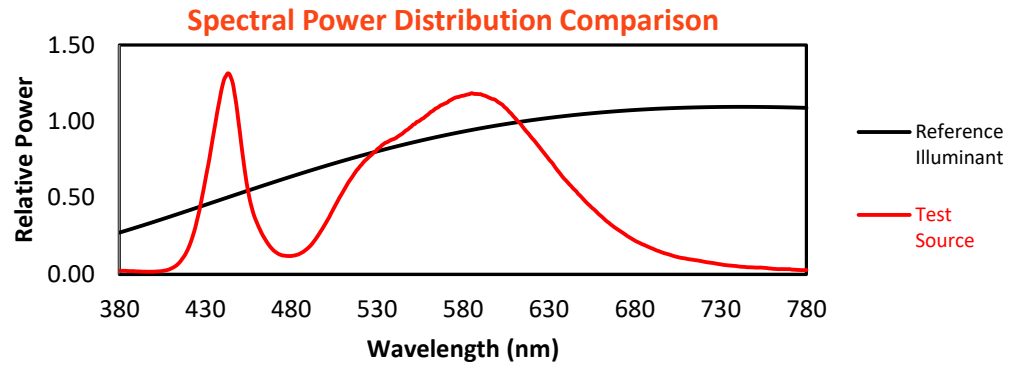
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2304             | 0.0              | 490       | 19043            | 15.8             | 620       | 97577            | 0.1              | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 22.0             | 625       | 90158            | 0.0              | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 29.2             | 630       | 82240            | 0.0              | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 36.6             | 635       | 74361            | 0.0              | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 42.2             | 640       | 66994            | 0.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 44.9             | 645       | 60405            | 0.0              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 44.9             | 650       | 53806            | 0.0              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 42.4             | 655       | 47610            | 0.0              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 38.6             | 660       | 42018            | 0.0              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 33.9             | 665       | 36742            | 0.0              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.2              | 540       | 96845            | 28.3             | 670       | 32105            | 0.0              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.6              | 545       | 100829           | 23.4             | 675       | 27946            | 0.0              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 2.1              | 550       | 105648           | 19.0             | 680       | 24146            | 0.0              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 5.9              | 555       | 110017           | 14.8             | 685       | 21191            | 0.0              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 14.3             | 560       | 114586           | 11.3             | 690       | 18544            | 0.0              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 27.3             | 565       | 118987           | 8.4              | 695       | 16058            | 0.0              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 45.1             | 570       | 122326           | 6.0              | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 55.3             | 575       | 125968           | 4.2              | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 47.2             | 580       | 127613           | 2.9              | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 30.8             | 585       | 129466           | 1.9              | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 21.7             | 590       | 128813           | 1.3              | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 16.1             | 595       | 126387           | 0.8              | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 12.0             | 600       | 123477           | 0.5              | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 10.3             | 605       | 118718           | 0.3              | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 10.5             | 610       | 112091           | 0.2              | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 12.1             | 615       | 105039           | 0.1              | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

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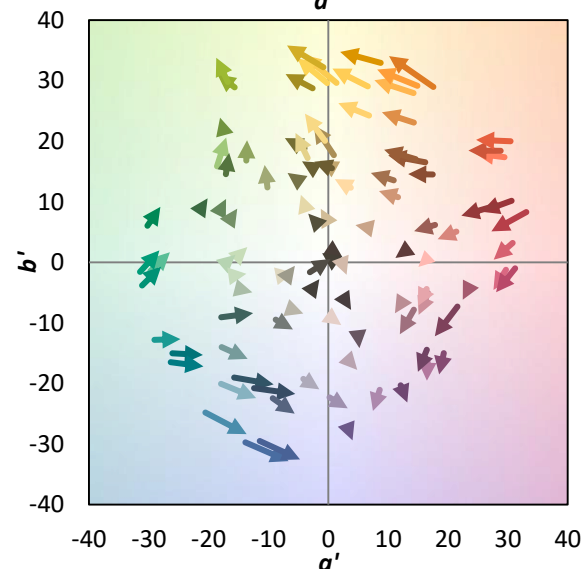
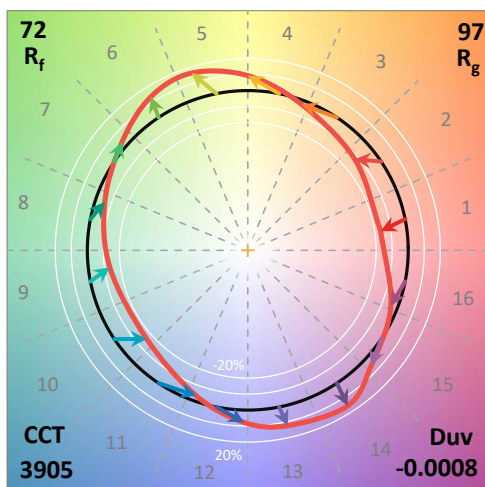
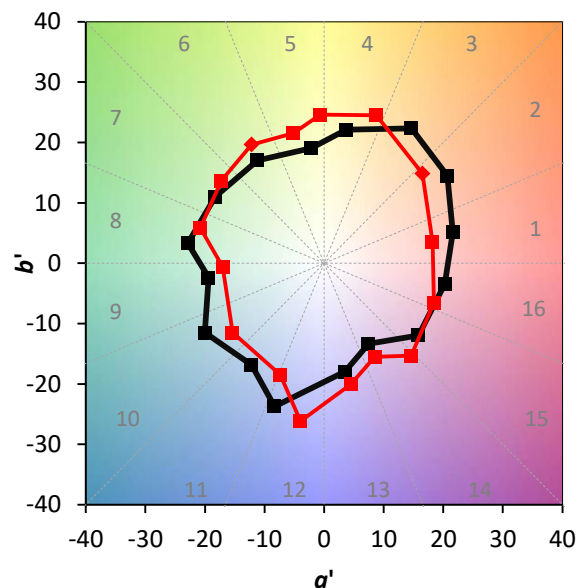
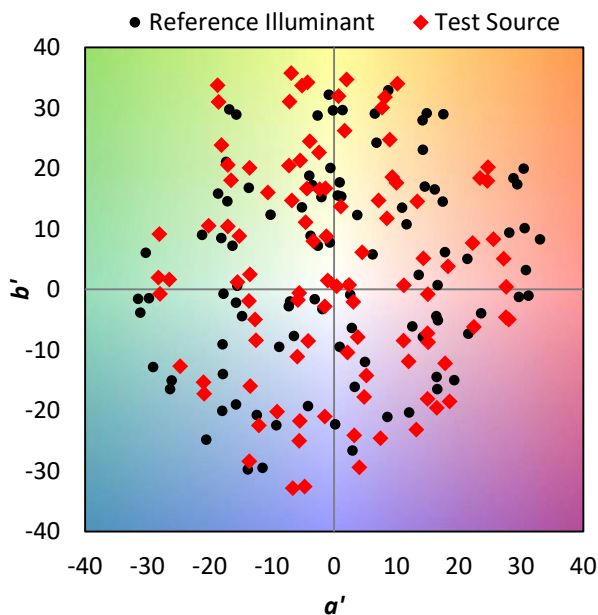
TM-30-18

### Summary

$R_f = 71.7$   
 $R_g = 96.9$   
 CIE  $R_a = 71.2$   
 $R_g = -29.7$



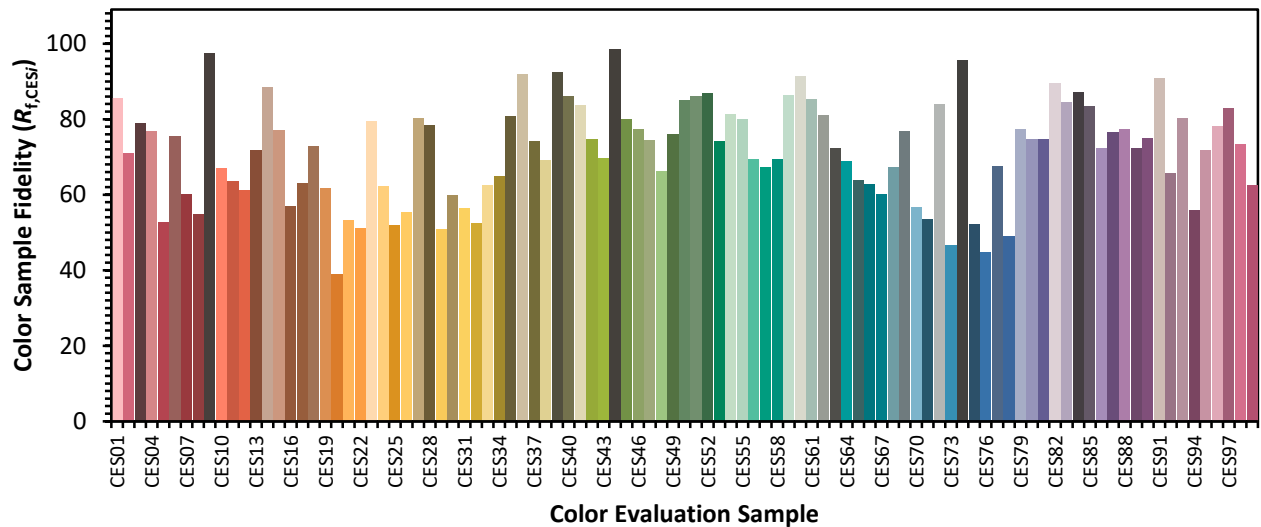
### Color Vector Graphics



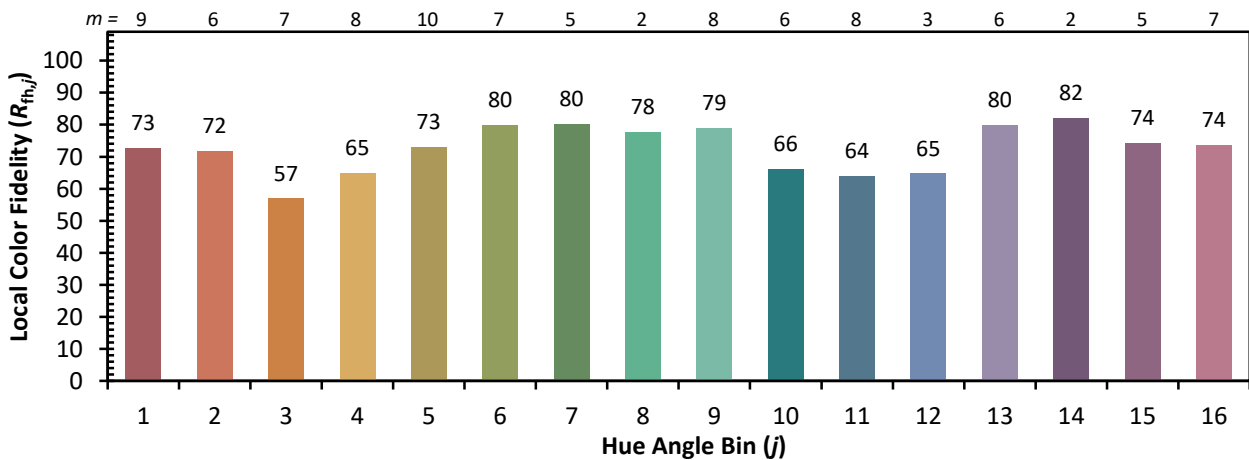
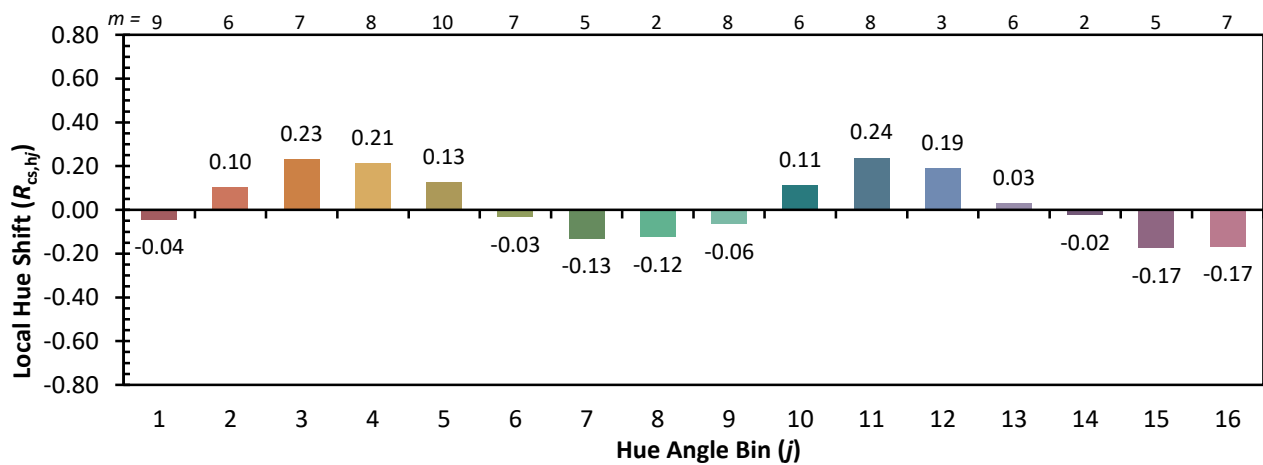
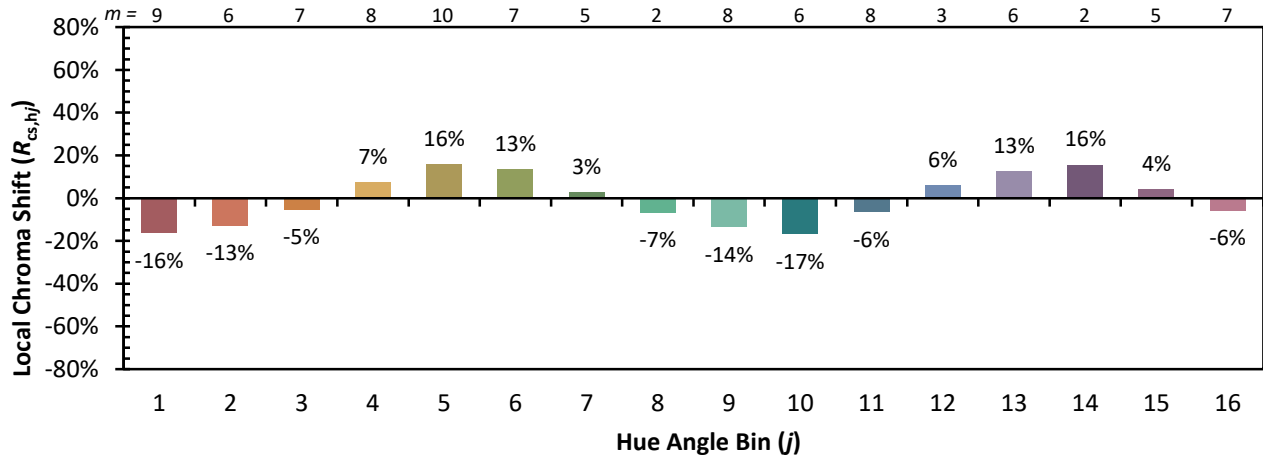


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

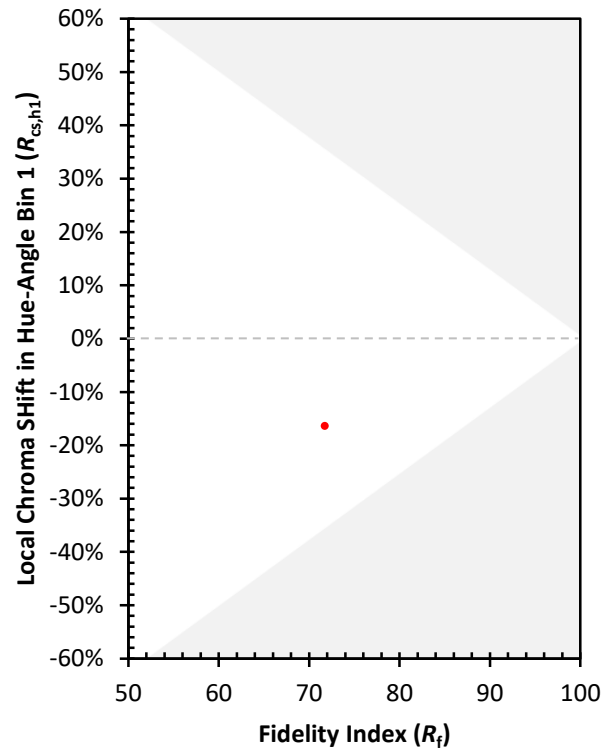
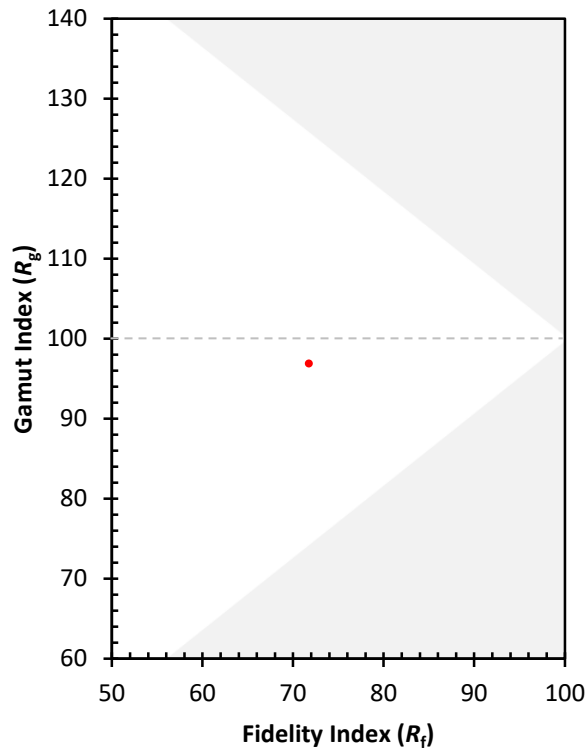
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 55 | CES51 = 86 | CES76 = 45 |
| CES02 = 61 | CES27 = 80 | CES52 = 87 | CES77 = 68 |
| CES03 = 30 | CES28 = 79 | CES53 = 74 | CES78 = 49 |
| CES04 = 70 | CES29 = 51 | CES54 = 81 | CES79 = 77 |
| CES05 = 47 | CES30 = 60 | CES55 = 80 | CES80 = 75 |
| CES06 = 50 | CES31 = 56 | CES56 = 69 | CES81 = 75 |
| CES07 = 40 | CES32 = 52 | CES57 = 67 | CES82 = 90 |
| CES08 = 39 | CES33 = 62 | CES58 = 69 | CES83 = 85 |
| CES09 = 29 | CES34 = 65 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 81 | CES60 = 91 | CES85 = 83 |
| CES11 = 57 | CES36 = 92 | CES61 = 85 | CES86 = 72 |
| CES12 = 63 | CES37 = 74 | CES62 = 81 | CES87 = 77 |
| CES13 = 42 | CES38 = 69 | CES63 = 72 | CES88 = 77 |
| CES14 = 74 | CES39 = 92 | CES64 = 69 | CES89 = 72 |
| CES15 = 71 | CES40 = 86 | CES65 = 64 | CES90 = 75 |
| CES16 = 46 | CES41 = 84 | CES66 = 63 | CES91 = 91 |
| CES17 = 49 | CES42 = 75 | CES67 = 60 | CES92 = 66 |
| CES18 = 56 | CES43 = 70 | CES68 = 67 | CES93 = 80 |
| CES19 = 72 | CES44 = 98 | CES69 = 77 | CES94 = 56 |
| CES20 = 65 | CES45 = 80 | CES70 = 57 | CES95 = 72 |
| CES21 = 86 | CES46 = 77 | CES71 = 53 | CES96 = 78 |
| CES22 = 78 | CES47 = 74 | CES72 = 84 | CES97 = 83 |
| CES23 = 92 | CES48 = 66 | CES73 = 47 | CES98 = 73 |
| CES24 = 91 | CES49 = 76 | CES74 = 96 | CES99 = 63 |
| CES25 = 72 | CES50 = 85 | CES75 = 52 |            |



### Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)