

Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P387170

Luminaire Tested: **GWC-SA2D-830-U-SL3-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P387170  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-23)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GWC-SA2D-830-U-SL3-HSS  
Description: GALLEON WALL LUMINAIRE  
(2) 80 CRI, 3000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 10993 lumens  
Efficiency: N/A  
Efficacy: 85.9 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B1 - U0 - G2

Input Watts (W): 128  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



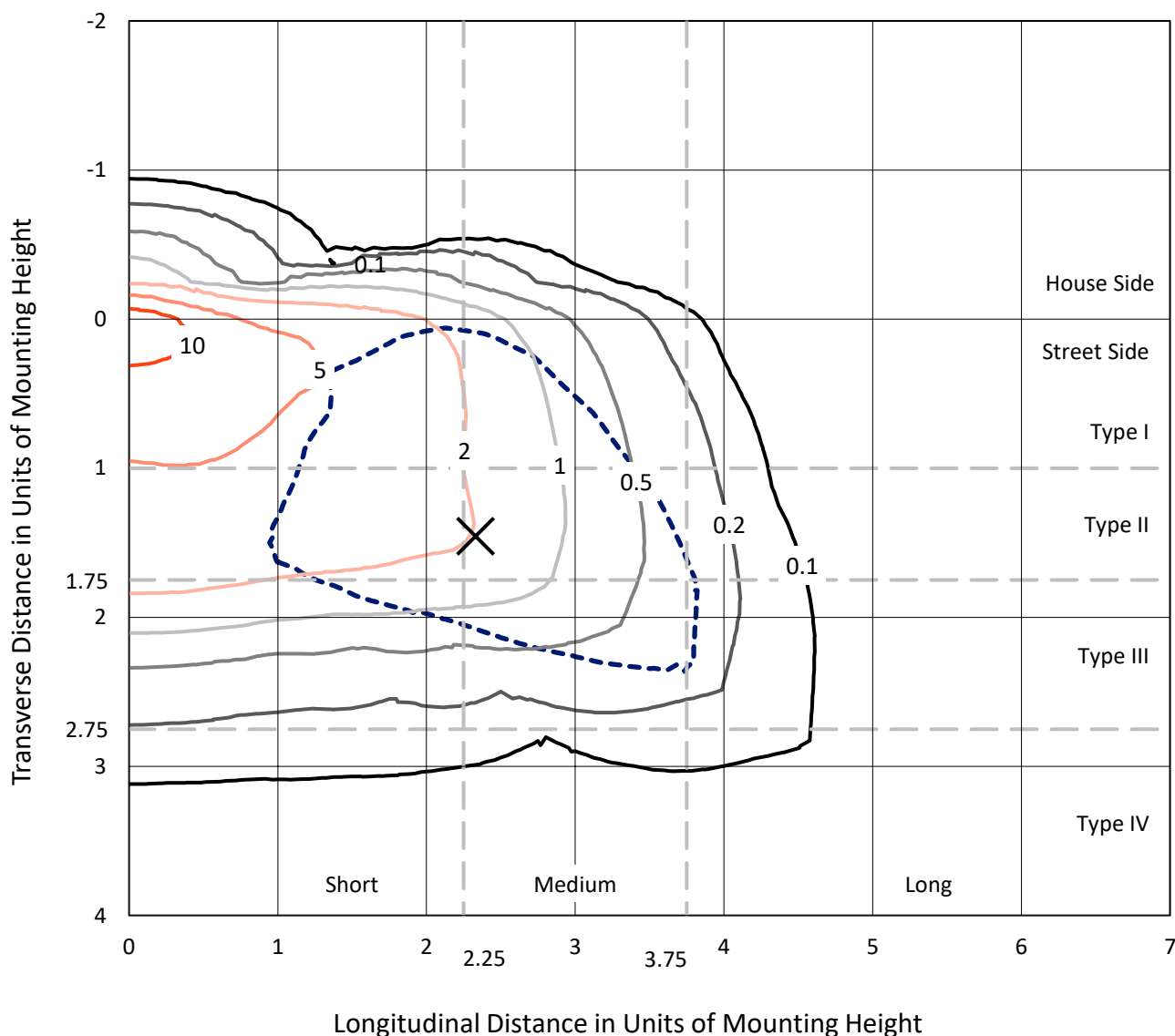
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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

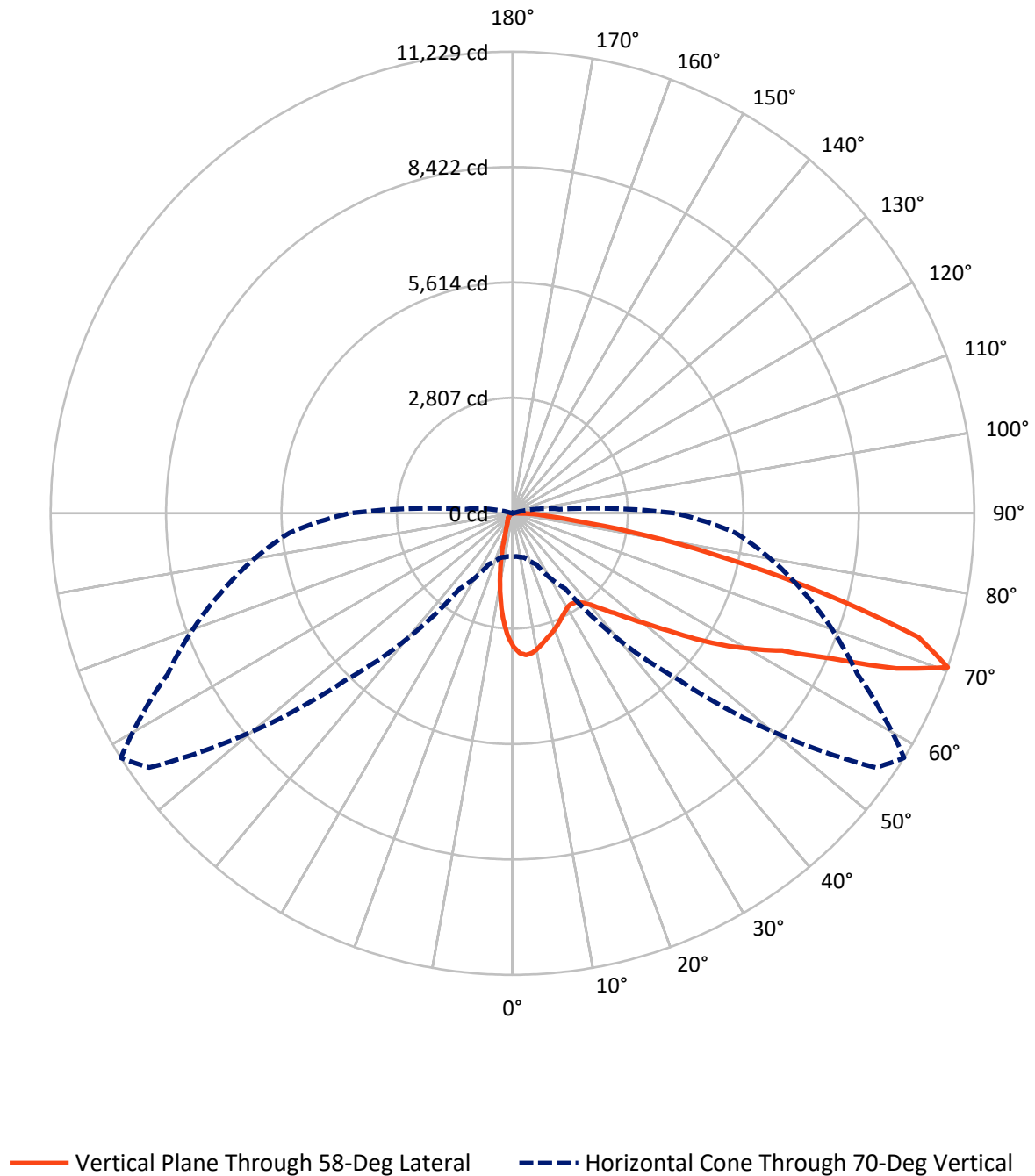


Based on 15 foot mounting height. Maximum calculated value = 14.7 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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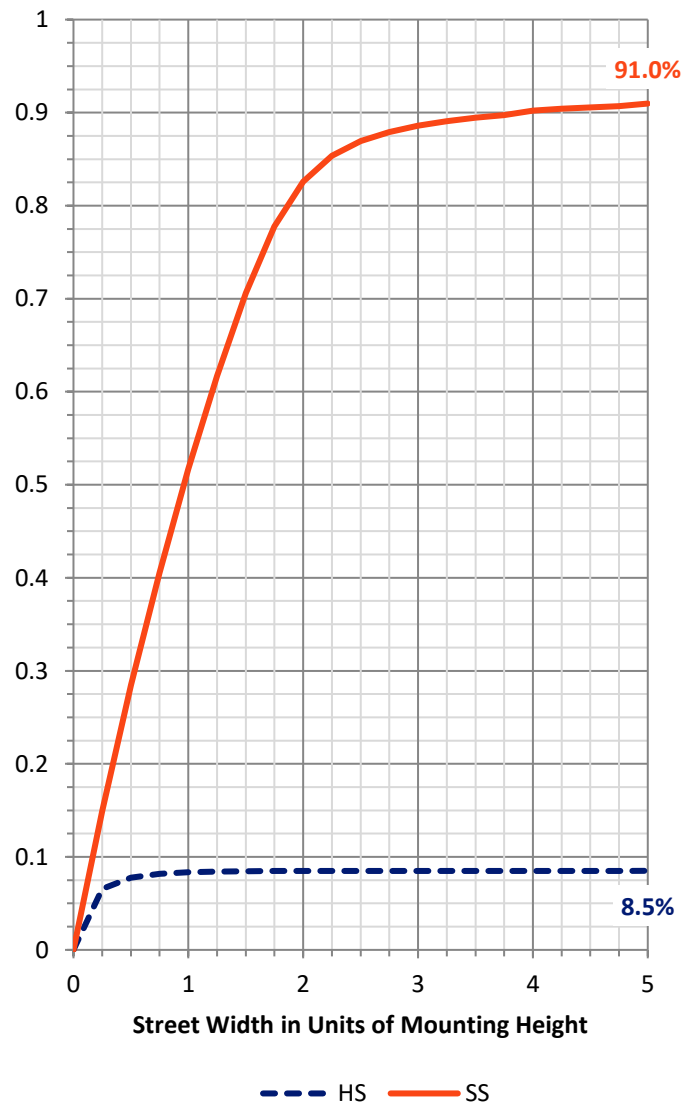
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 940.8    | 0.0    | 940.8   |
|                    | % Fixture | 8.6      | 0.0    | 8.6     |
| <b>Street Side</b> | Lumens    | 10052.2  | 0.0    | 10052.2 |
|                    | % Fixture | 91.4     | 0.0    | 91.4    |
| <b>Total</b>       | Lumens    | 10993.0  | 0.0    | 10993.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 265.5   | 2.4       |
| 10°-20°   | 557.3   | 5.1       |
| 20°-30°   | 732.7   | 6.7       |
| 30°-40°   | 970.3   | 8.8       |
| 40°-50°   | 1450.4  | 13.2      |
| 50°-60°   | 2323.4  | 21.1      |
| 60°-70°   | 2928.7  | 26.6      |
| 70°-80°   | 1579.7  | 14.4      |
| 80°-90°   | 184.9   | 1.7       |
| 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°    | 10993.0 | 100.0     |
| 0°-180°   | 10993.0 | 100.0     |

**Coefficient of Utilization**



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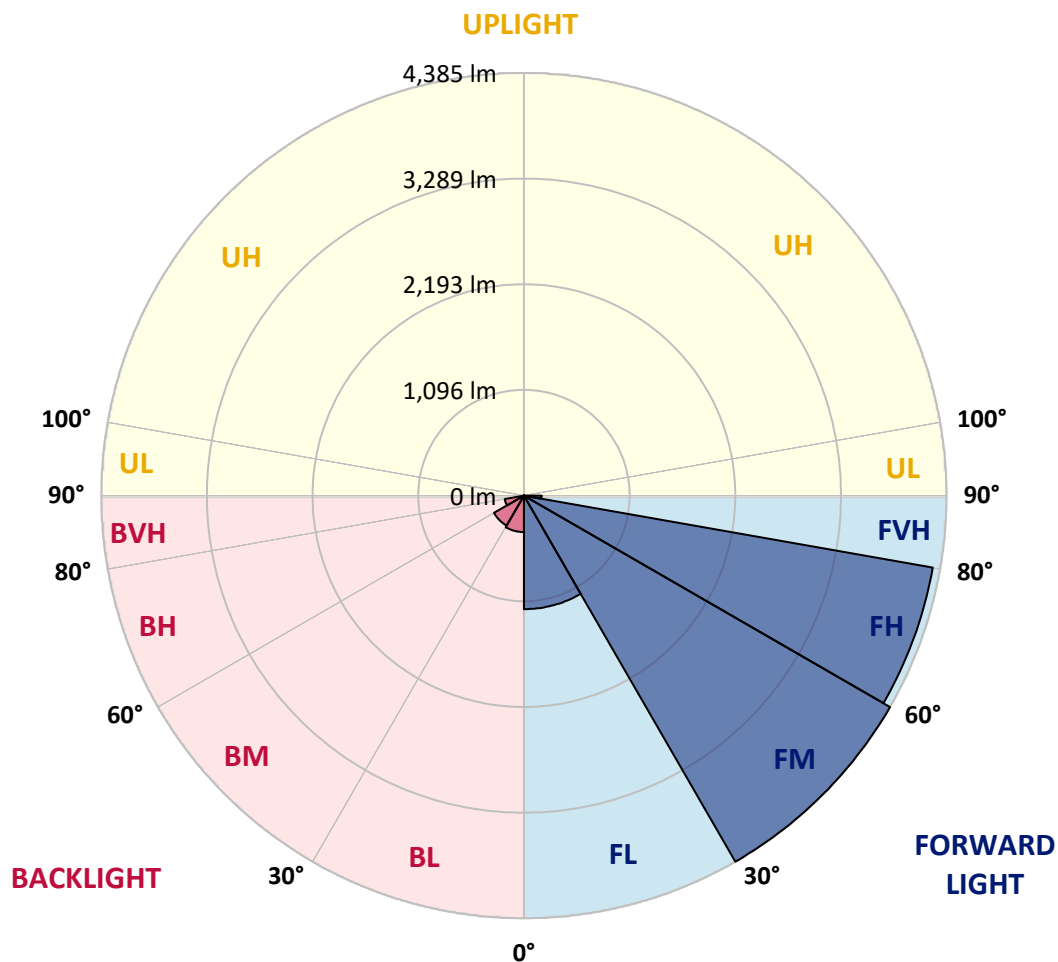
CATALOG NUMBER: GWC-SA2D-830-U-SL3-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1177.6 | 10.7      |                         |      |         |
| FM   | (30°-60°)   | 4385.3 | 39.9      |                         |      |         |
| FH   | (60°-80°)   | 4306.1 | 39.2      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 183.3  | 1.7       |                         |      | G2/225  |
| BL   | (0°-30°)    | 378.0  | 3.4       | B1/500                  |      |         |
| BM   | (30°-60°)   | 358.9  | 3.3       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 202.3  | 1.8       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 1.6    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°     | 58°     | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|
| 0°    | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3  | 3247.3  | 3247.3 | 3247.3 | 3247.3 |
| 2.5°  | 3516.5 | 3507.8 | 3504.6 | 3499.1 | 3478.1 | 3457.5 | 3416.9  | 3405.4  | 3379.8 | 3319.0 | 3254.6 |
| 5°    | 3519.3 | 3518.8 | 3528.4 | 3526.1 | 3518.8 | 3509.2 | 3479.9  | 3464.9  | 3421.4 | 3334.6 | 3216.7 |
| 7.5°  | 3349.7 | 3358.4 | 3379.8 | 3397.2 | 3417.3 | 3443.4 | 3447.0  | 3432.4  | 3396.8 | 3303.0 | 3146.7 |
| 10°   | 3122.0 | 3135.7 | 3165.9 | 3200.2 | 3252.8 | 3304.9 | 3351.5  | 3349.7  | 3337.3 | 3245.0 | 3062.6 |
| 12.5° | 2893.9 | 2909.9 | 2944.7 | 2995.4 | 3069.9 | 3154.9 | 3238.1  | 3249.6  | 3270.1 | 3192.9 | 2984.9 |
| 15°   | 2694.2 | 2707.9 | 2742.2 | 2804.3 | 2896.7 | 3011.0 | 3133.0  | 3154.0  | 3207.1 | 3152.2 | 2920.0 |
| 17.5° | 2524.6 | 2533.3 | 2558.4 | 2627.4 | 2734.4 | 2872.9 | 3031.5  | 3072.7  | 3151.7 | 3120.2 | 2863.8 |
| 20°   | 2406.2 | 2407.6 | 2424.0 | 2472.5 | 2579.4 | 2734.4 | 2926.4  | 2985.4  | 3093.2 | 3092.8 | 2805.7 |
| 22.5° | 2347.7 | 2343.1 | 2346.3 | 2374.2 | 2452.8 | 2602.3 | 2821.3  | 2891.2  | 3040.7 | 3069.5 | 2746.7 |
| 25°   | 2336.7 | 2333.1 | 2323.9 | 2327.6 | 2375.1 | 2486.7 | 2715.2  | 2796.1  | 2994.5 | 3055.3 | 2695.6 |
| 27.5° | 2371.0 | 2374.7 | 2359.1 | 2342.7 | 2346.3 | 2411.7 | 2621.0  | 2714.8  | 2957.0 | 3055.3 | 2659.4 |
| 30°   | 2440.0 | 2441.9 | 2430.4 | 2408.9 | 2380.2 | 2390.7 | 2555.7  | 2649.4  | 2938.3 | 3076.3 | 2636.6 |
| 32.5° | 2516.4 | 2526.4 | 2525.1 | 2507.7 | 2466.5 | 2424.0 | 2540.1  | 2625.6  | 2936.9 | 3122.9 | 2634.3 |
| 35°   | 2611.0 | 2622.4 | 2641.6 | 2638.0 | 2595.0 | 2525.1 | 2593.2  | 2660.4  | 2963.9 | 3199.7 | 2659.0 |
| 37.5° | 2711.6 | 2728.9 | 2770.1 | 2789.7 | 2761.8 | 2682.8 | 2712.0  | 2760.0  | 3036.1 | 3324.1 | 2721.6 |
| 40°   | 2808.9 | 2828.6 | 2903.5 | 2980.8 | 2959.8 | 2878.4 | 2892.1  | 2930.5  | 3164.5 | 3502.8 | 2840.5 |
| 42.5° | 2904.5 | 2933.7 | 3043.9 | 3170.9 | 3196.1 | 3131.2 | 3138.5  | 3169.1  | 3355.2 | 3748.7 | 3034.7 |
| 45°   | 3018.7 | 3051.6 | 3214.8 | 3371.6 | 3438.8 | 3410.5 | 3441.6  | 3461.7  | 3604.3 | 4073.7 | 3296.6 |
| 47.5° | 3186.5 | 3224.4 | 3424.6 | 3603.4 | 3721.3 | 3739.6 | 3802.2  | 3815.5  | 3919.2 | 4452.2 | 3638.1 |
| 50°   | 3513.8 | 3524.3 | 3705.3 | 3867.6 | 4037.6 | 4147.3 | 4218.6  | 4228.7  | 4300.5 | 4865.9 | 4064.6 |
| 52.5° | 3925.6 | 3932.5 | 4034.9 | 4143.7 | 4337.0 | 4561.0 | 4727.8  | 4742.0  | 4757.1 | 5269.1 | 4485.6 |
| 55°   | 4334.7 | 4333.8 | 4401.5 | 4465.5 | 4686.7 | 5012.2 | 5374.2  | 5382.9  | 5274.5 | 5651.7 | 4807.4 |
| 57.5° | 4590.3 | 4614.9 | 4717.8 | 4800.1 | 5109.1 | 5526.4 | 6028.8  | 6060.8  | 5818.0 | 5935.1 | 5125.5 |
| 60°   | 4508.9 | 4520.8 | 4748.9 | 5053.3 | 5635.2 | 6257.3 | 6691.1  | 6699.3  | 6226.7 | 6218.0 | 5527.8 |
| 62.5° | 3841.5 | 3847.9 | 4206.3 | 4833.9 | 5901.7 | 7205.4 | 7490.1  | 7356.2  | 6696.6 | 6610.7 | 6009.1 |
| 65°   | 2632.9 | 2674.5 | 2973.9 | 3749.6 | 5412.1 | 7800.1 | 8727.1  | 8505.4  | 7412.9 | 7176.6 | 6444.3 |
| 67.5° | 1550.5 | 1541.8 | 1689.9 | 2261.3 | 3975.0 | 7405.1 | 10291.7 | 10071.4 | 8389.7 | 7555.5 | 6316.7 |
| 70°   | 1059.1 | 1053.2 | 1109.9 | 1369.0 | 2243.9 | 5744.4 | 10784.0 | 11228.8 | 9252.3 | 7300.4 | 5436.4 |
| 72.5° | 756.1  | 759.3  | 842.9  | 1063.7 | 1408.8 | 3346.9 | 9273.8  | 10326.5 | 8982.1 | 6364.3 | 4132.2 |
| 75°   | 513.3  | 522.0  | 641.8  | 872.6  | 1235.1 | 1702.7 | 6581.0  | 7849.9  | 7314.2 | 4625.5 | 2375.1 |
| 77.5° | 276.1  | 285.7  | 426.9  | 703.0  | 1116.7 | 1183.0 | 4233.3  | 5402.5  | 4594.4 | 2079.4 | 688.4  |
| 80°   | 115.2  | 120.7  | 199.8  | 511.0  | 965.0  | 1039.0 | 2490.8  | 3276.1  | 1957.8 | 410.0  | 153.6  |
| 82.5° | 49.8   | 52.6   | 83.2   | 304.9  | 721.3  | 877.2  | 1318.8  | 1576.1  | 593.3  | 90.0   | 77.3   |
| 85°   | 9.6    | 10.1   | 34.3   | 161.4  | 460.3  | 495.0  | 854.8   | 837.9   | 266.5  | 38.9   | 56.2   |
| 87.5° | 0.0    | 0.0    | 8.2    | 50.7   | 135.3  | 269.7  | 521.6   | 515.2   | 90.5   | 18.7   | 21.0   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    |

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CATALOG NUMBER: GWC-SA2D-830-U-SL3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 | 3247.3 |
| 2.5°  | 3221.7 | 3190.1 | 3123.9 | 3042.0 | 2979.4 | 2910.4 | 2855.5 | 2786.1 | 2755.9 | 2757.3 | 2740.8 |
| 5°    | 3149.5 | 3084.6 | 2937.8 | 2752.7 | 2610.1 | 2462.9 | 2336.3 | 2210.1 | 2135.6 | 2111.4 | 2088.5 |
| 7.5°  | 3046.2 | 2943.3 | 2709.3 | 2424.0 | 2182.7 | 1946.8 | 1741.6 | 1561.0 | 1446.7 | 1391.0 | 1370.4 |
| 10°   | 2929.6 | 2785.1 | 2446.4 | 2070.7 | 1726.0 | 1407.0 | 1140.9 | 909.6  | 817.3  | 754.7  | 738.7  |
| 12.5° | 2827.2 | 2631.6 | 2189.5 | 1708.2 | 1299.1 | 914.2  | 660.5  | 516.5  | 453.9  | 429.2  | 425.1  |
| 15°   | 2730.8 | 2488.0 | 1942.2 | 1380.0 | 899.6  | 562.7  | 420.1  | 371.2  | 356.5  | 352.4  | 352.4  |
| 17.5° | 2639.8 | 2351.4 | 1700.4 | 1056.8 | 595.2  | 394.5  | 347.9  | 336.9  | 332.3  | 331.9  | 332.3  |
| 20°   | 2544.7 | 2214.7 | 1462.7 | 774.3  | 415.5  | 334.1  | 321.3  | 315.4  | 314.0  | 314.0  | 314.0  |
| 22.5° | 2453.7 | 2078.0 | 1231.4 | 553.1  | 333.2  | 304.9  | 298.5  | 294.4  | 293.0  | 292.5  | 291.6  |
| 25°   | 2366.4 | 1948.2 | 1005.6 | 390.8  | 292.5  | 279.3  | 273.8  | 268.3  | 264.2  | 261.9  | 260.6  |
| 27.5° | 2294.7 | 1832.5 | 795.4  | 313.6  | 264.2  | 252.8  | 245.9  | 237.7  | 227.6  | 223.1  | 221.2  |
| 30°   | 2237.5 | 1726.9 | 613.0  | 264.7  | 237.7  | 226.3  | 215.8  | 201.6  | 187.0  | 179.2  | 178.7  |
| 32.5° | 2192.7 | 1623.2 | 465.3  | 234.0  | 213.9  | 199.8  | 184.7  | 166.8  | 149.9  | 141.2  | 140.8  |
| 35°   | 2170.8 | 1531.8 | 355.6  | 211.6  | 192.9  | 175.1  | 156.3  | 136.7  | 120.2  | 112.0  | 111.1  |
| 37.5° | 2185.4 | 1454.5 | 277.5  | 192.9  | 175.1  | 154.5  | 132.6  | 112.0  | 97.4   | 90.0   | 89.6   |
| 40°   | 2238.9 | 1405.1 | 225.4  | 176.9  | 160.0  | 134.8  | 111.1  | 91.9   | 79.5   | 73.6   | 73.1   |
| 42.5° | 2352.7 | 1386.9 | 192.4  | 163.6  | 145.4  | 116.6  | 92.3   | 75.9   | 64.5   | 60.3   | 59.4   |
| 45°   | 2542.9 | 1413.8 | 170.0  | 150.8  | 130.3  | 99.2   | 76.3   | 62.2   | 52.1   | 48.9   | 48.5   |
| 47.5° | 2796.1 | 1484.7 | 154.0  | 138.5  | 116.6  | 83.7   | 63.5   | 50.3   | 42.5   | 39.3   | 38.9   |
| 50°   | 3122.5 | 1597.1 | 140.8  | 126.2  | 103.8  | 70.9   | 52.6   | 39.8   | 32.9   | 30.6   | 30.6   |
| 52.5° | 3477.7 | 1731.1 | 128.9  | 114.7  | 91.0   | 59.0   | 42.5   | 30.6   | 26.1   | 23.3   | 23.3   |
| 55°   | 3771.1 | 1848.1 | 116.1  | 106.0  | 75.4   | 48.9   | 32.5   | 23.3   | 19.2   | 17.8   | 17.8   |
| 57.5° | 4064.1 | 1972.9 | 101.5  | 91.0   | 60.3   | 39.8   | 24.7   | 17.4   | 14.2   | 13.3   | 13.3   |
| 60°   | 4444.0 | 2125.5 | 87.3   | 74.1   | 47.5   | 30.2   | 18.3   | 12.3   | 10.5   | 10.1   | 10.1   |
| 62.5° | 4861.8 | 2215.1 | 74.5   | 59.4   | 37.0   | 22.4   | 13.3   | 8.2    | 7.8    | 7.8    | 7.3    |
| 65°   | 5117.3 | 2088.5 | 62.6   | 47.5   | 28.8   | 16.9   | 8.7    | 5.9    | 6.9    | 6.4    | 5.5    |
| 67.5° | 4791.4 | 1635.1 | 51.2   | 37.0   | 22.4   | 12.8   | 5.5    | 4.1    | 7.3    | 5.9    | 4.6    |
| 70°   | 3967.2 | 1144.6 | 39.8   | 26.1   | 17.8   | 11.0   | 3.7    | 2.7    | 7.8    | 5.9    | 3.7    |
| 72.5° | 2968.9 | 766.1  | 31.5   | 17.4   | 13.3   | 9.6    | 3.2    | 1.4    | 6.9    | 5.0    | 3.2    |
| 75°   | 1622.3 | 308.5  | 25.1   | 11.0   | 8.2    | 6.9    | 2.3    | 0.9    | 4.6    | 3.7    | 2.3    |
| 77.5° | 426.9  | 81.4   | 18.3   | 7.3    | 4.6    | 2.7    | 1.4    | 0.5    | 2.3    | 1.8    | 0.9    |
| 80°   | 108.8  | 31.5   | 11.9   | 5.0    | 3.2    | 1.4    | 0.0    | 0.0    | 0.5    | 0.0    | 0.0    |
| 82.5° | 58.1   | 13.3   | 7.3    | 3.7    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 43.9   | 8.7    | 4.1    | 2.3    | 0.5    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 16.9   | 2.7    | 1.4    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2012-088-3

Luminaire Tested: WIS-SA-830-2D-U-SL4

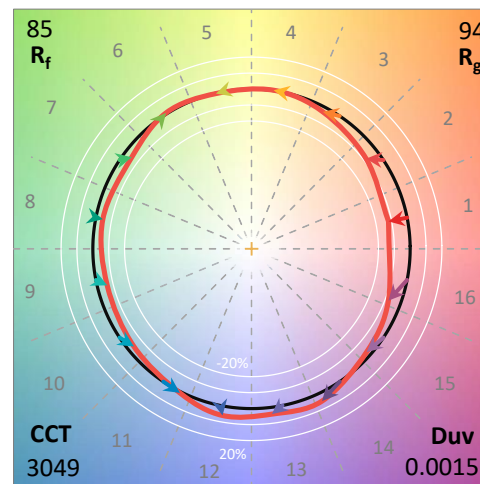
Test Date: 01/11/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2012-088-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 01/11/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-SA-830-2D-U-SL4**  
 Description: INVUE. WALL PACK LIGHT SQUARE SL4 OPTICS 2-SQUARE.

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3049   | CRI (Ra): | 81.7 |      |      |
| CIE u':                   | 0.2482 | R1:       | 79.6 | R9:  | 1.9  |
| CIE v':                   | 0.5224 | R2:       | 90.6 | R10: | 79.3 |
| Duv:                      | 0.0015 | R3:       | 95.7 | R11: | 78.7 |
| CIE x:                    | 0.4354 | R4:       | 79.4 | R12: | 72.2 |
| CIE y:                    | 0.4072 | R5:       | 80.2 | R13: | 82.2 |
| CIE z:                    | 0.1574 | R6:       | 89.0 | R14: | 98.1 |
| Peak Wavelength (nm):     | 601    | R7:       | 82.2 |      |      |
| Dominant Wavelength (nm): | 582    | R8:       | 57.0 |      |      |
| Purity:                   | 53     |           |      |      |      |
| Rf:                       | 85.1   |           |      |      |      |
| Rg:                       | 94.3   |           |      |      |      |



### Test Conditions

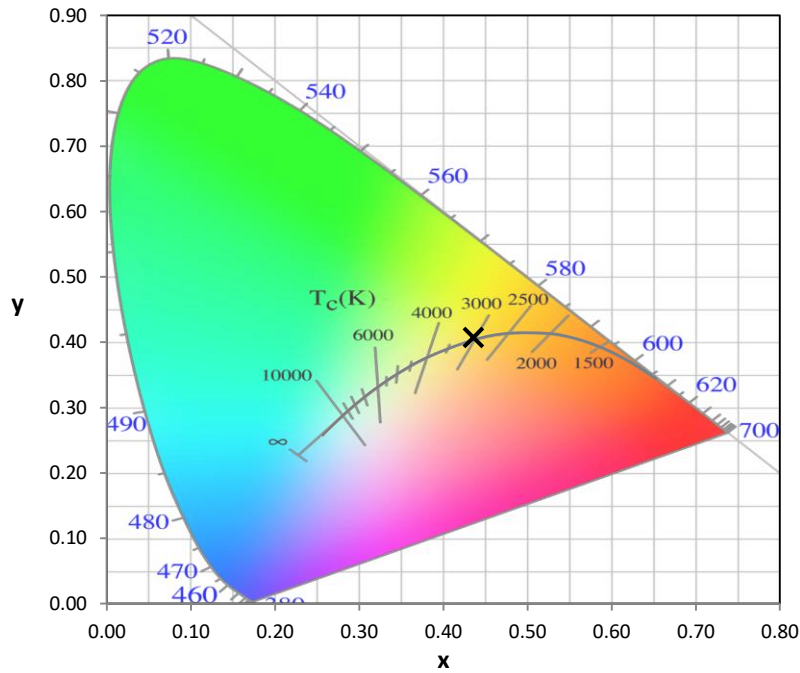
Stabilization Time: 83M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.6/29%  
 Sphere Temperature (°C): 25.6

REPORT NUMBER: SP1-2012-088-3

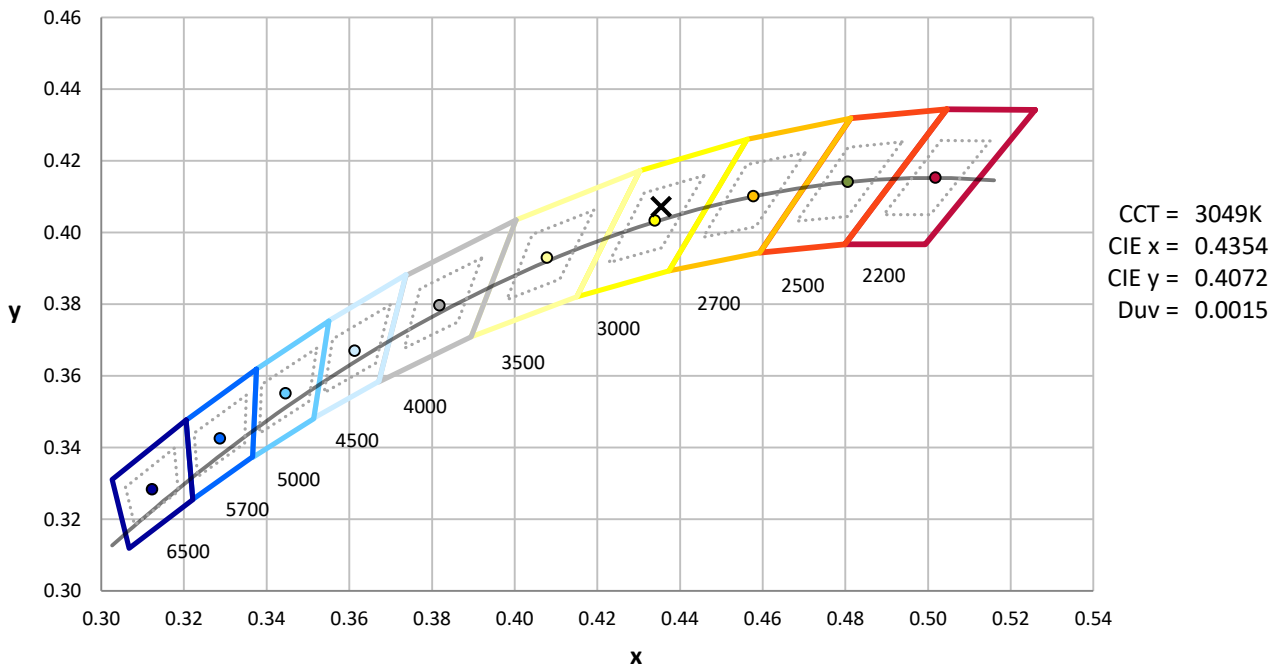
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| 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**



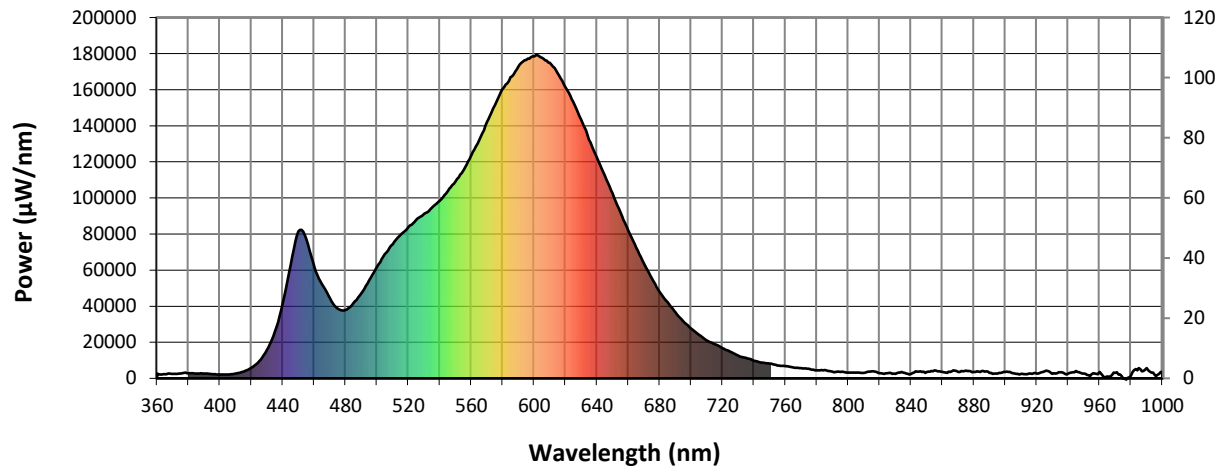
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

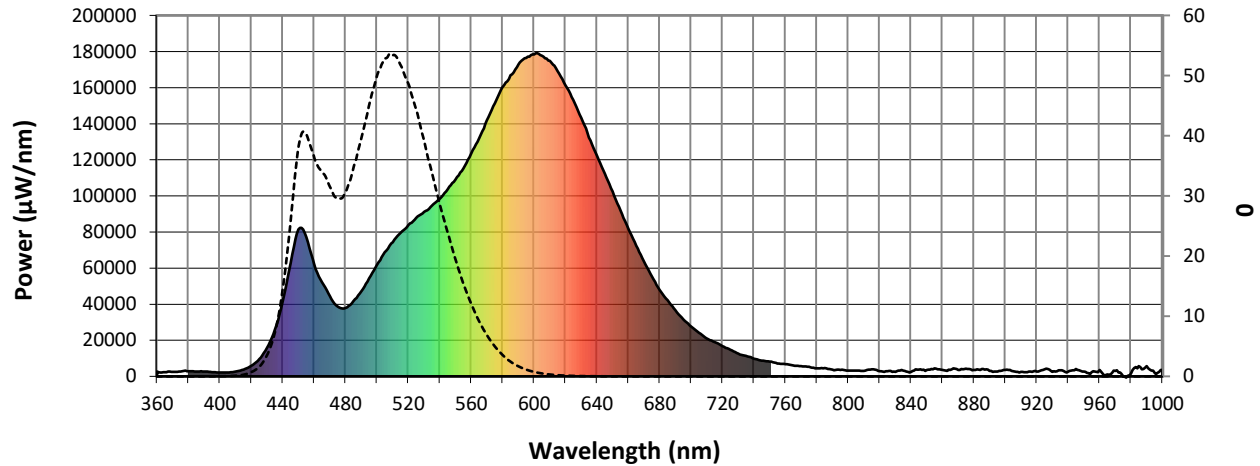


#####

| 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       | 2750             | 0.0              | 490       | 47173            | 6.7              | 620       | 161309           | 42.0             | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 9.8              | 625       | 153301           | 33.8             | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 13.6             | 630       | 143292           | 25.9             | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 19.3             | 635       | 132368           | 19.9             | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 25.5             | 640       | 122334           | 14.6             | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 32.9             | 645       | 112200           | 10.8             | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 40.6             | 650       | 102448           | 7.5              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 47.1             | 655       | 91886            | 5.3              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 53.7             | 660       | 81865            | 3.4              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.0              | 535       | 94694            | 58.7             | 665       | 72448            | 2.3              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.0              | 540       | 98431            | 64.1             | 670       | 63654            | 1.4              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.0              | 545       | 103765           | 69.1             | 675       | 55284            | 0.9              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 0.0              | 550       | 109130           | 74.2             | 680       | 47949            | 0.6              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 0.1              | 555       | 115271           | 78.7             | 685       | 42173            | 0.4              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 0.1              | 560       | 123390           | 83.9             | 690       | 36755            | 0.2              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 0.3              | 565       | 131926           | 87.7             | 695       | 31630            | 0.1              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 0.7              | 570       | 141815           | 92.2             | 700       | 27642            | 0.1              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 1.3              | 575       | 151359           | 94.2             | 705       | 24213            | 0.1              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 2.1              | 580       | 160364           | 95.3             | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 2.6              | 585       | 166836           | 92.7             | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 2.6              | 590       | 172885           | 89.4             | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 2.7              | 595       | 176548           | 83.7             | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 2.8              | 600       | 178427           | 76.9             | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 3.0              | 605       | 177729           | 68.8             | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 3.6              | 610       | 174846           | 60.1             | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 4.9              | 615       | 169274           | 51.1             | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



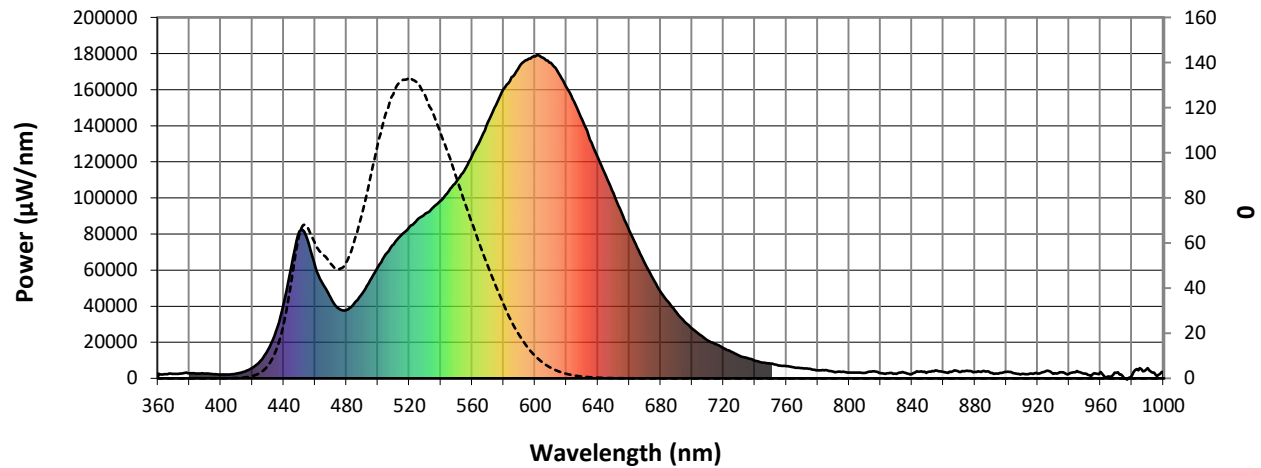
Scotopic Lumens: 4584.8

S/P: 0.52

| 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       | 2750             | 0.0              | 490       | 47173            | 72.6             | 620       | 161309           | 2.0              | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 87.7             | 625       | 153301           | 1.3              | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 103.4            | 630       | 143292           | 0.8              | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 117.0            | 635       | 132368           | 0.5              | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 126.0            | 640       | 122334           | 0.3              | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 131.6            | 645       | 112200           | 0.2              | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 133.2            | 650       | 102448           | 0.1              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 131.3            | 655       | 91886            | 0.1              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 125.8            | 660       | 81865            | 0.0              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.1              | 535       | 94694            | 118.0            | 665       | 72448            | 0.0              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.2              | 540       | 98431            | 108.8            | 670       | 63654            | 0.0              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.4              | 545       | 103765           | 99.5             | 675       | 55284            | 0.0              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 1.0              | 550       | 109130           | 89.2             | 680       | 47949            | 0.0              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 2.3              | 555       | 115271           | 78.8             | 685       | 42173            | 0.0              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 5.4              | 560       | 123390           | 69.0             | 690       | 36755            | 0.0              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 11.6             | 565       | 131926           | 59.2             | 695       | 31630            | 0.0              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 23.2             | 570       | 141815           | 50.0             | 700       | 27642            | 0.0              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 42.1             | 575       | 151359           | 41.2             | 705       | 24213            | 0.0              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 63.1             | 580       | 160364           | 33.0             | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 67.4             | 585       | 166836           | 25.5             | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 60.3             | 590       | 172885           | 19.3             | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 55.1             | 595       | 176548           | 14.1             | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 51.0             | 600       | 178427           | 10.1             | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 48.4             | 605       | 177729           | 7.0              | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 51.4             | 610       | 174846           | 4.7              | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 60.4             | 615       | 169274           | 3.1              | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 12033.4 S/P: 1.36**

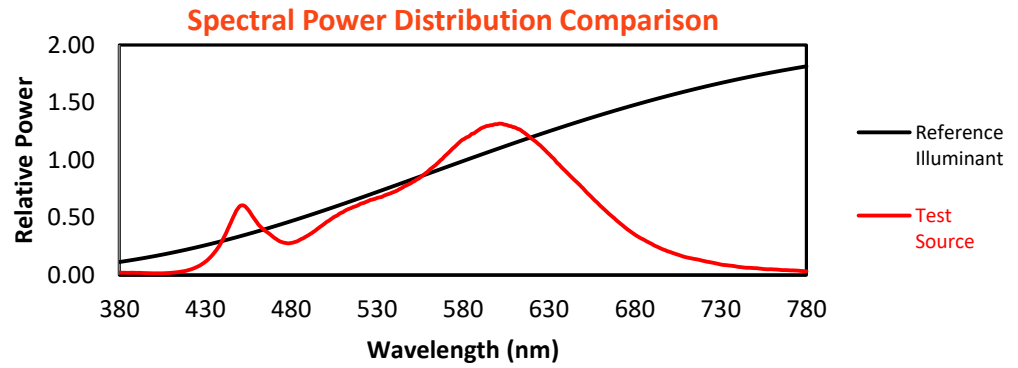
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2750             | 0.0              | 490       | 47173            | 39.3             | 620       | 161309           | 0.1              | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 44.8             | 625       | 153301           | 0.1              | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 49.7             | 630       | 143292           | 0.0              | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 52.8             | 635       | 132368           | 0.0              | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 53.4             | 640       | 122334           | 0.0              | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 51.9             | 645       | 112200           | 0.0              | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 48.8             | 650       | 102448           | 0.0              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 44.5             | 655       | 91886            | 0.0              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 39.4             | 660       | 81865            | 0.0              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.0              | 535       | 94694            | 34.1             | 665       | 72448            | 0.0              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.1              | 540       | 98431            | 28.8             | 670       | 63654            | 0.0              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.2              | 545       | 103765           | 24.1             | 675       | 55284            | 0.0              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 0.7              | 550       | 109130           | 19.6             | 680       | 47949            | 0.0              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 1.5              | 555       | 115271           | 15.5             | 685       | 42173            | 0.0              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 3.3              | 560       | 123390           | 12.2             | 690       | 36755            | 0.0              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 6.9              | 565       | 131926           | 9.3              | 695       | 31630            | 0.0              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 13.9             | 570       | 141815           | 6.9              | 700       | 27642            | 0.0              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 24.8             | 575       | 151359           | 5.0              | 705       | 24213            | 0.0              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 37.5             | 580       | 160364           | 3.6              | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 40.4             | 585       | 166836           | 2.5              | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 36.8             | 590       | 172885           | 1.7              | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 34.1             | 595       | 176548           | 1.1              | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 31.7             | 600       | 178427           | 0.8              | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 29.5             | 605       | 177729           | 0.5              | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 30.6             | 610       | 174846           | 0.3              | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 34.3             | 615       | 169274           | 0.2              | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

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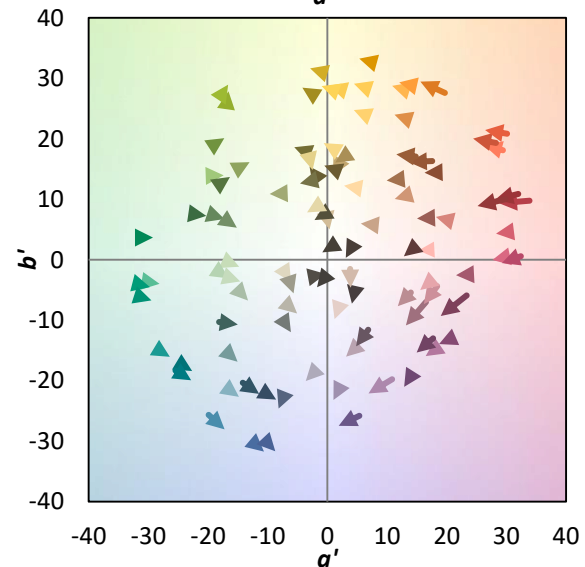
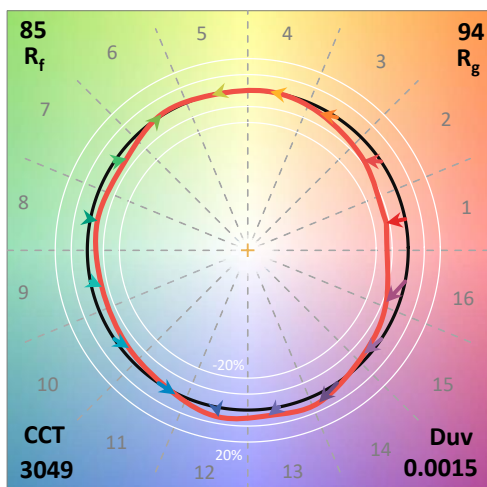
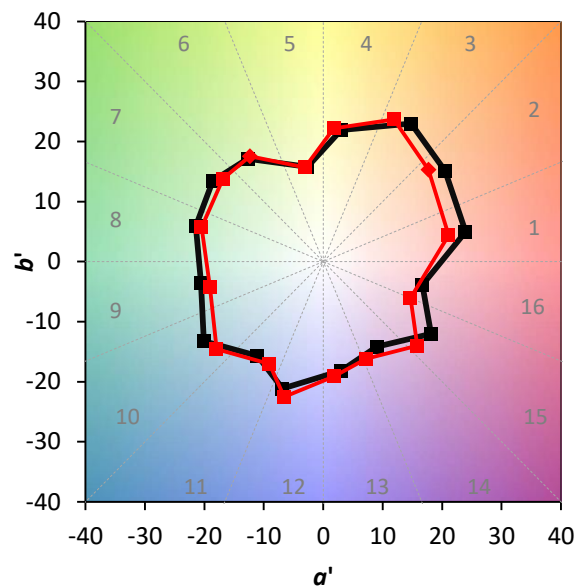
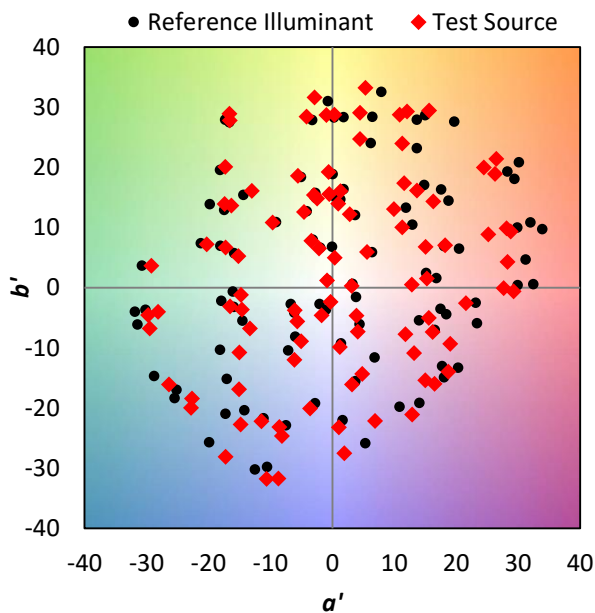
TM-30-18

### Summary

$R_f = 85.1$   
 $R_g = 94.3$   
 CIE  $R_a = 81.7$   
 $R_g = 1.9$



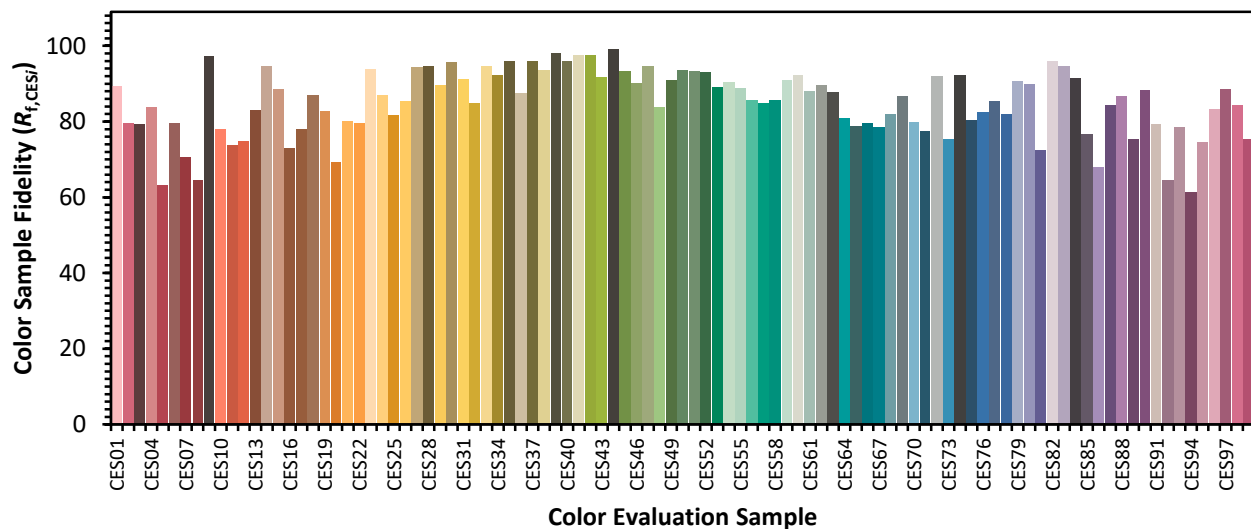
### Color Vector Graphics



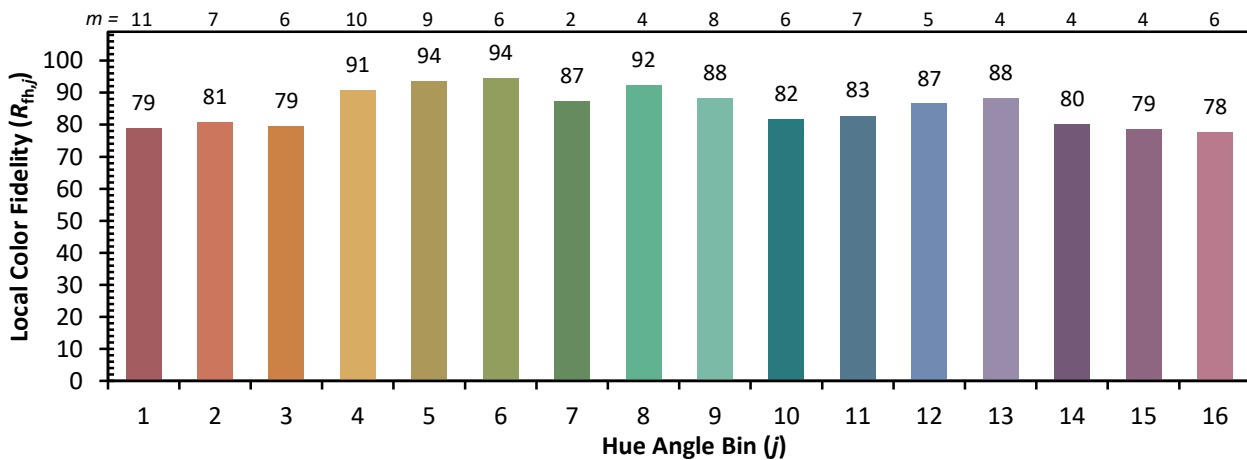
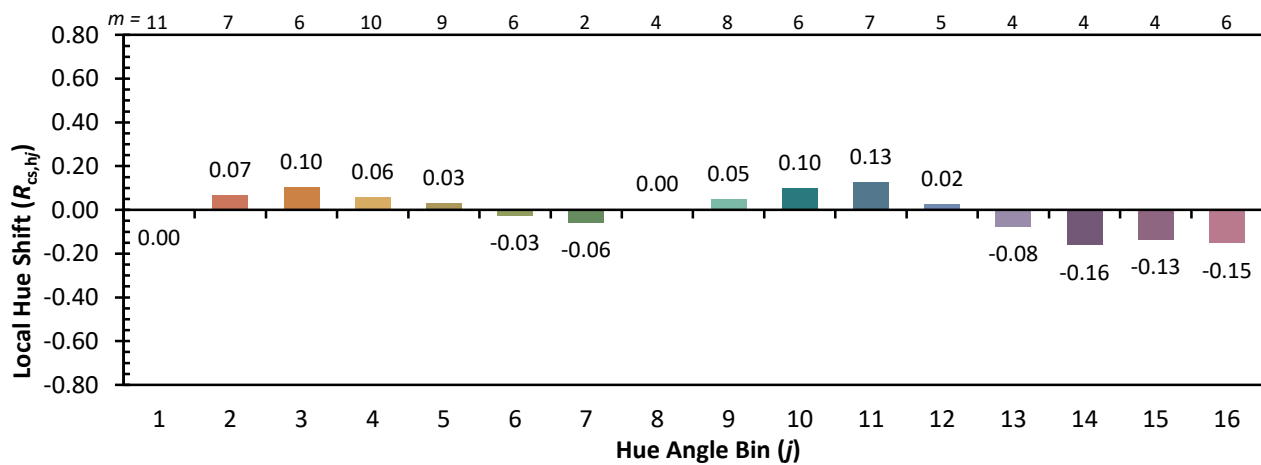
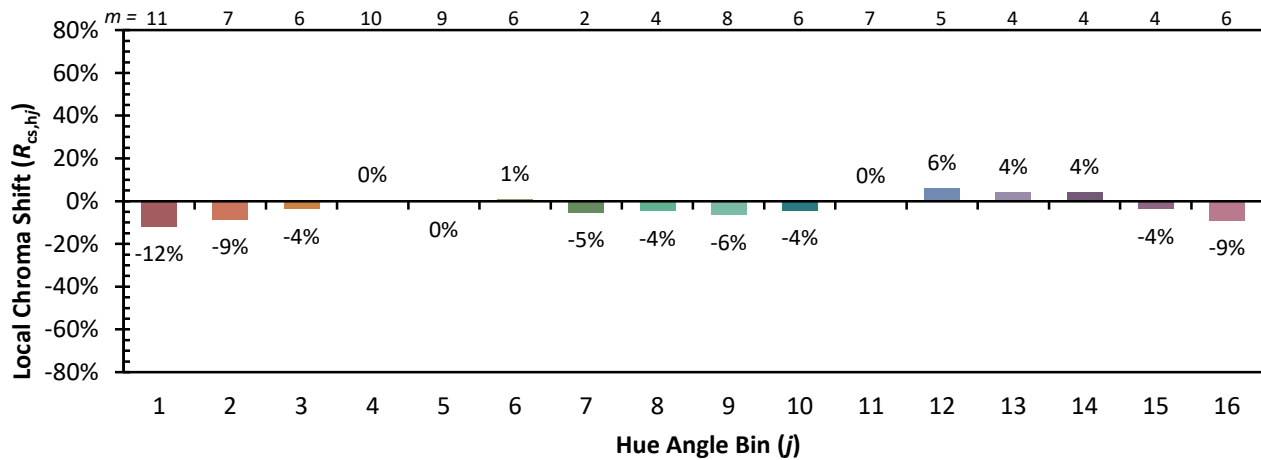


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

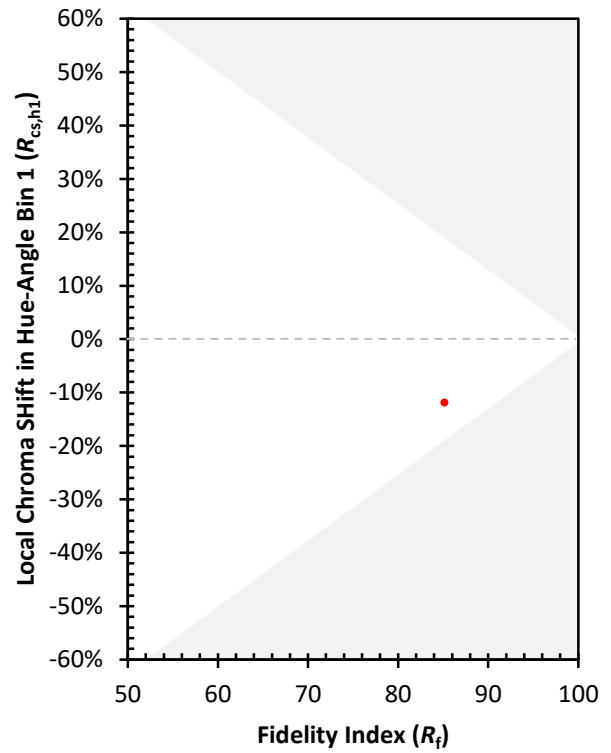
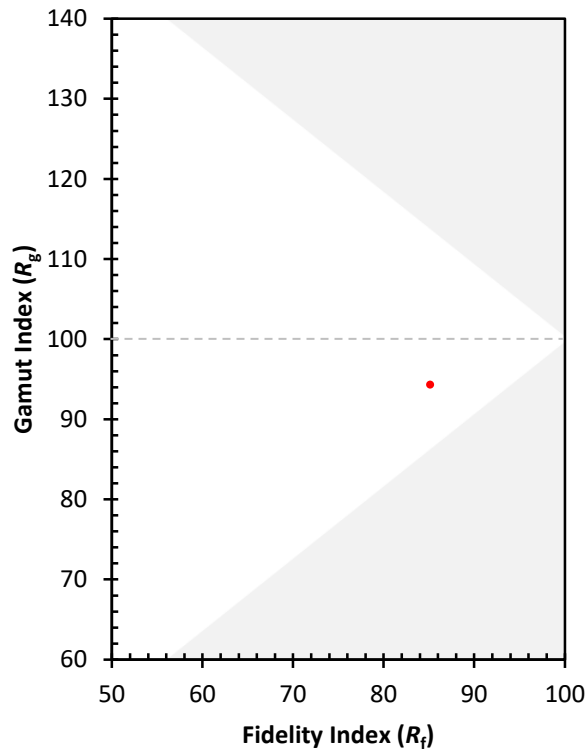
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 93 | CES76 = 82 |
| CES02 = 63 | CES27 = 94 | CES52 = 93 | CES77 = 85 |
| CES03 = 31 | CES28 = 95 | CES53 = 89 | CES78 = 82 |
| CES04 = 70 | CES29 = 90 | CES54 = 90 | CES79 = 91 |
| CES05 = 49 | CES30 = 96 | CES55 = 89 | CES80 = 90 |
| CES06 = 51 | CES31 = 91 | CES56 = 86 | CES81 = 72 |
| CES07 = 42 | CES32 = 85 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 95 | CES58 = 86 | CES83 = 95 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 76 | CES35 = 96 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 87 | CES61 = 88 | CES86 = 68 |
| CES12 = 65 | CES37 = 96 | CES62 = 90 | CES87 = 84 |
| CES13 = 43 | CES38 = 94 | CES63 = 88 | CES88 = 87 |
| CES14 = 74 | CES39 = 98 | CES64 = 81 | CES89 = 75 |
| CES15 = 71 | CES40 = 96 | CES65 = 79 | CES90 = 88 |
| CES16 = 47 | CES41 = 97 | CES66 = 80 | CES91 = 79 |
| CES17 = 50 | CES42 = 98 | CES67 = 78 | CES92 = 65 |
| CES18 = 56 | CES43 = 92 | CES68 = 82 | CES93 = 78 |
| CES19 = 72 | CES44 = 99 | CES69 = 87 | CES94 = 61 |
| CES20 = 66 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 90 | CES71 = 77 | CES96 = 83 |
| CES22 = 79 | CES47 = 95 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 84 | CES73 = 75 | CES98 = 84 |
| CES24 = 91 | CES49 = 91 | CES74 = 92 | CES99 = 75 |
| CES25 = 72 | CES50 = 94 | CES75 = 80 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)