

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: STREETWORKS

Report Number: P361627

Luminaire Tested: NVN-SA3C-760-U-T4W

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P361627  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA3C-760-U-T4W  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(3) 70 CRI, 5700K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 21270 lumens  
Efficiency: N/A  
Efficacy: 128.1 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G4

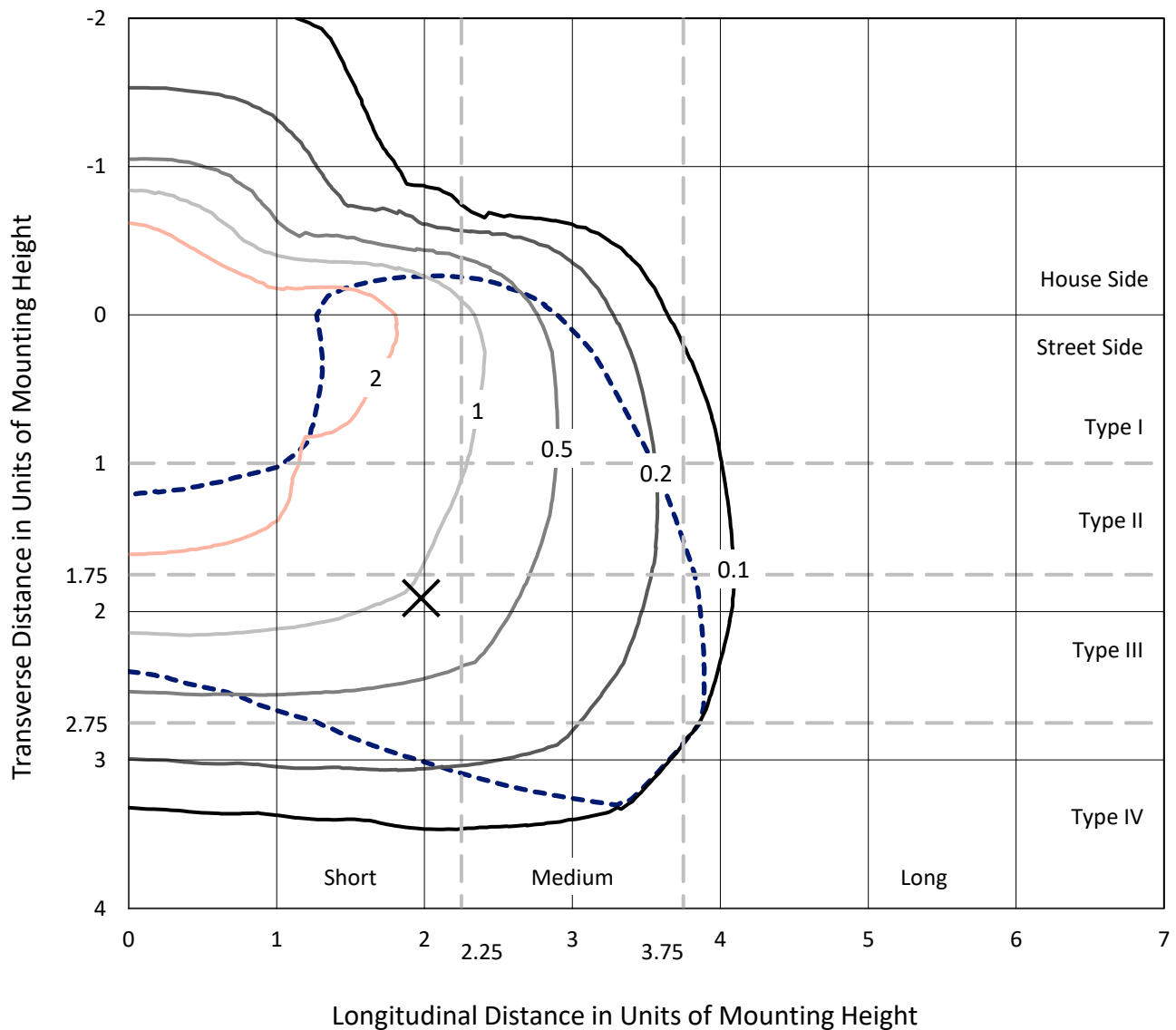
Input Watts (W): 166  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

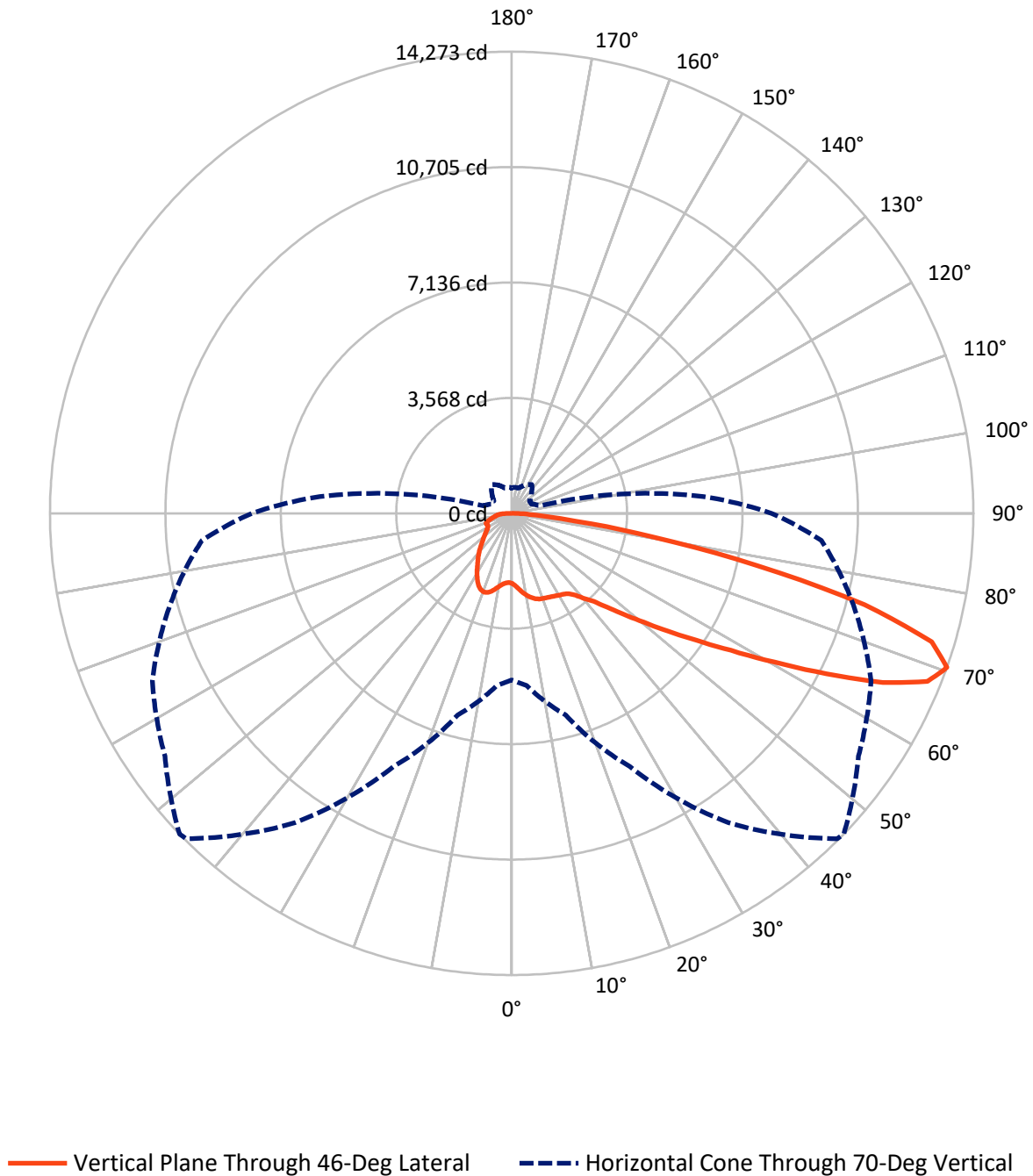
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 4.3 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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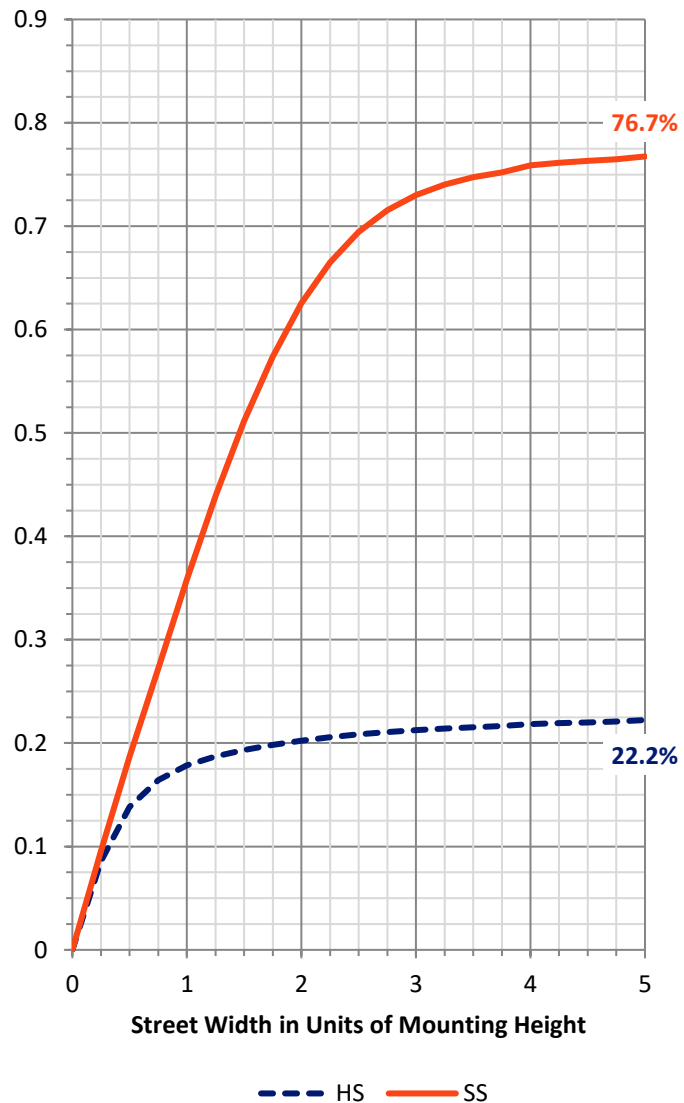
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 4875.0   | 0.0    | 4875.0  |
|                    | % Fixture | 22.9     | 0.0    | 22.9    |
| <b>Street Side</b> | Lumens    | 16395.0  | 0.0    | 16395.0 |
|                    | % Fixture | 77.1     | 0.0    | 77.1    |
| <b>Total</b>       | Lumens    | 21270.0  | 0.0    | 21270.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 220.9   | 1.0       |
| 10°-20°   | 736.0   | 3.5       |
| 20°-30°   | 1227.2  | 5.8       |
| 30°-40°   | 1741.5  | 8.2       |
| 40°-50°   | 2561.6  | 12.0      |
| 50°-60°   | 4338.1  | 20.4      |
| 60°-70°   | 6157.8  | 29.0      |
| 70°-80°   | 3740.9  | 17.6      |
| 80°-90°   | 545.9   | 2.6       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 21270.0 | 100.0     |
| 0°-180°   | 21270.0 | 100.0     |

**Coefficient of Utilization**



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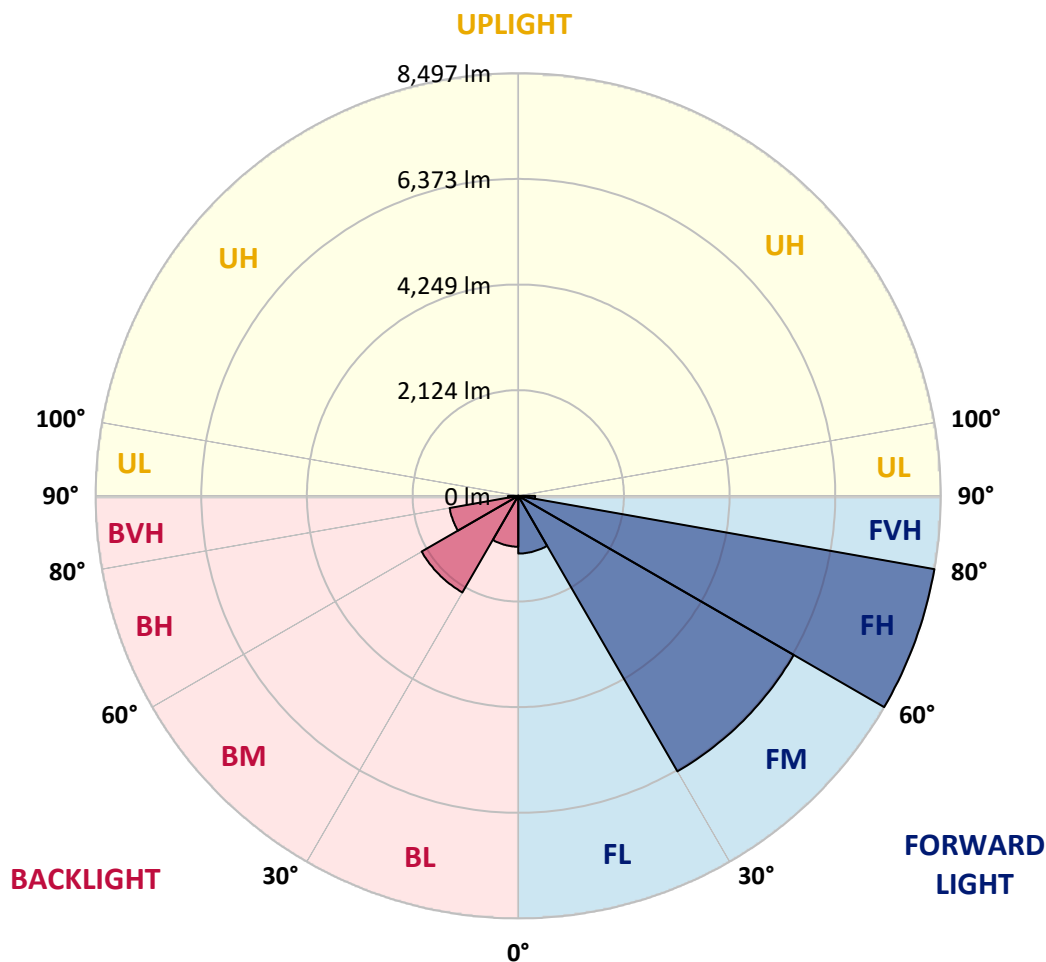
CATALOG NUMBER: NVN-SA3C-760-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1160.6 | 5.5       |                         |      |          |
| FM   | (30°-60°)   | 6397.1 | 30.1      |                         |      |          |
| FH   | (60°-80°)   | 8497.2 | 39.9      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 340.1  | 1.6       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1023.5 | 4.8       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2244.1 | 10.6      | B2/2500                 |      |          |
| BH   | (60°-80°)   | 1401.5 | 6.6       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 205.9  | 1.0       |                         |      | G2/225   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°     | 35°     | 45°     | 46°     | 55°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2167.0 | 2167.0 | 2167.0 | 2167.0  | 2167.0  | 2167.0  | 2167.0  | 2167.0  | 2167.0  | 2167.0  | 2167.0  |
| 2.5°  | 2275.5 | 2276.9 | 2279.8 | 2272.5  | 2252.2  | 2246.3  | 2244.2  | 2223.0  | 2209.2  | 2188.8  | 2171.4  |
| 5°    | 2457.4 | 2458.9 | 2454.5 | 2434.1  | 2389.0  | 2355.5  | 2352.6  | 2304.6  | 2260.9  | 2214.3  | 2179.4  |
| 7.5°  | 2647.4 | 2649.6 | 2635.8 | 2597.2  | 2533.9  | 2475.6  | 2472.0  | 2406.5  | 2340.2  | 2269.6  | 2217.2  |
| 10°   | 2815.6 | 2806.8 | 2784.3 | 2730.4  | 2655.4  | 2584.1  | 2581.2  | 2512.8  | 2436.3  | 2351.2  | 2281.3  |
| 12.5° | 2927.7 | 2920.4 | 2891.3 | 2825.8  | 2743.5  | 2678.0  | 2672.2  | 2608.8  | 2534.6  | 2441.4  | 2357.7  |
| 15°   | 2989.5 | 2994.6 | 2955.3 | 2881.1  | 2801.0  | 2745.7  | 2740.6  | 2695.5  | 2629.2  | 2535.3  | 2439.2  |
| 17.5° | 2997.5 | 3001.9 | 2964.1 | 2890.5  | 2825.0  | 2787.2  | 2785.0  | 2755.2  | 2707.1  | 2616.8  | 2516.4  |
| 20°   | 2951.0 | 2953.9 | 2922.6 | 2862.2  | 2819.2  | 2807.6  | 2806.8  | 2793.7  | 2758.1  | 2678.0  | 2580.5  |
| 22.5° | 2883.3 | 2885.4 | 2862.9 | 2819.2  | 2804.6  | 2822.8  | 2827.9  | 2822.8  | 2797.4  | 2722.4  | 2630.7  |
| 25°   | 2866.5 | 2865.1 | 2841.8 | 2797.4  | 2809.7  | 2848.3  | 2854.9  | 2857.1  | 2839.6  | 2774.1  | 2694.7  |
| 27.5° | 2947.3 | 2942.2 | 2897.8 | 2826.5  | 2834.5  | 2881.1  | 2889.8  | 2910.9  | 2900.0  | 2842.5  | 2767.5  |
| 30°   | 3181.0 | 3172.2 | 3081.3 | 2937.1  | 2897.8  | 2921.8  | 2932.8  | 2966.2  | 2968.4  | 2920.4  | 2864.3  |
| 32.5° | 3575.5 | 3564.6 | 3401.5 | 3143.9  | 3004.8  | 2963.3  | 2973.5  | 3023.8  | 3050.7  | 3013.6  | 2953.1  |
| 35°   | 4074.1 | 4061.8 | 3847.7 | 3495.4  | 3183.9  | 3042.7  | 3050.0  | 3090.0  | 3143.9  | 3091.4  | 3011.4  |
| 37.5° | 4593.9 | 4564.0 | 4358.0 | 3908.9  | 3468.5  | 3212.3  | 3212.3  | 3217.4  | 3242.9  | 3133.7  | 3079.8  |
| 40°   | 5110.7 | 5080.8 | 4894.5 | 4395.1  | 3836.8  | 3479.4  | 3462.7  | 3349.9  | 3329.5  | 3235.6  | 3217.4  |
| 42.5° | 5591.1 | 5582.4 | 5472.4 | 4944.7  | 4269.2  | 3742.2  | 3718.9  | 3527.5  | 3531.8  | 3473.6  | 3474.3  |
| 45°   | 6102.1 | 6102.1 | 6012.6 | 5499.4  | 4772.9  | 4164.4  | 4141.1  | 3859.4  | 3903.1  | 3876.1  | 3940.9  |
| 47.5° | 6519.2 | 6532.3 | 6519.9 | 6077.3  | 5358.9  | 4700.9  | 4658.6  | 4319.4  | 4441.7  | 4534.2  | 4722.7  |
| 50°   | 6945.0 | 6965.4 | 6967.6 | 6711.4  | 6067.2  | 5338.5  | 5290.5  | 4930.2  | 5203.1  | 5468.1  | 5838.6  |
| 52.5° | 7563.0 | 7608.9 | 7426.2 | 7343.9  | 6934.8  | 6095.5  | 6048.2  | 5715.6  | 6171.2  | 6543.2  | 7181.6  |
| 55°   | 8135.9 | 8095.8 | 7965.6 | 8016.5  | 7863.6  | 6957.4  | 6921.7  | 6629.8  | 7250.0  | 7733.3  | 8562.4  |
| 57.5° | 8446.0 | 8443.1 | 8574.1 | 8792.5  | 8865.3  | 8020.1  | 7990.3  | 7706.4  | 8466.4  | 8829.6  | 9858.9  |
| 60°   | 8809.9 | 8815.0 | 9139.7 | 9635.4  | 9935.3  | 9343.5  | 9330.4  | 9114.9  | 9647.8  | 9853.0  | 10875.7 |
| 62.5° | 8860.9 | 8952.6 | 9511.6 | 10364.8 | 10936.9 | 10889.6 | 10918.7 | 10383.7 | 10704.7 | 10669.7 | 11635.0 |
| 65°   | 8274.9 | 8395.7 | 9407.5 | 10585.3 | 11932.7 | 12580.5 | 12607.5 | 11659.7 | 11538.1 | 11367.8 | 11906.5 |
| 67.5° | 7073.9 | 7252.9 | 8352.1 | 10105.6 | 12261.0 | 13830.3 | 13868.2 | 12648.9 | 12229.7 | 11604.4 | 11252.8 |
| 70°   | 5147.8 | 5346.5 | 6452.9 | 8630.9  | 11675.7 | 14230.0 | 14272.9 | 13086.4 | 12255.9 | 10931.1 | 9606.3  |
| 72.5° | 3109.6 | 3265.4 | 4177.5 | 6354.0  | 9854.5  | 13502.1 | 13578.5 | 12531.7 | 11189.5 | 9259.1  | 7093.5  |
| 75°   | 1365.6 | 1467.5 | 2020.0 | 3661.4  | 7054.9  | 11171.3 | 11266.6 | 10726.5 | 9091.6  | 6728.8  | 4192.8  |
| 77.5° | 581.6  | 610.7  | 828.4  | 1590.5  | 3988.2  | 7633.6  | 7764.6  | 7837.4  | 6168.3  | 3661.4  | 1771.7  |
| 80°   | 362.5  | 374.1  | 468.8  | 719.9   | 1866.4  | 4287.4  | 4428.6  | 4611.3  | 3063.1  | 1345.9  | 618.7   |
| 82.5° | 220.6  | 233.7  | 311.5  | 435.3   | 971.8   | 1943.5  | 2011.2  | 2140.1  | 1188.7  | 581.6   | 320.3   |
| 85°   | 132.5  | 141.9  | 190.7  | 275.2   | 553.2   | 764.3   | 763.6   | 844.4   | 559.8   | 374.1   | 168.9   |
| 87.5° | 63.3   | 70.6   | 101.9  | 142.7   | 278.8   | 286.8   | 268.6   | 304.3   | 339.9   | 245.3   | 85.2    |
| 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: P361627

CATALOG NUMBER: NVN-SA3C-760-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2167.0  | 2167.0 | 2167.0 | 2167.0 | 2167.0 | 2167.0 | 2167.0 | 2167.0 | 2167.0 | 2167.0 | 2167.0 |
| 2.5°  | 2165.5  | 2162.6 | 2153.2 | 2145.9 | 2144.4 | 2140.1 | 2136.4 | 2138.6 | 2141.5 | 2142.2 | 2142.2 |
| 5°    | 2164.8  | 2156.8 | 2144.4 | 2139.3 | 2145.9 | 2154.6 | 2165.5 | 2180.1 | 2188.8 | 2195.4 | 2199.8 |
| 7.5°  | 2199.8  | 2184.5 | 2170.6 | 2167.7 | 2180.8 | 2204.1 | 2228.9 | 2259.4 | 2280.6 | 2295.1 | 2298.0 |
| 10°   | 2258.0  | 2239.1 | 2225.2 | 2228.1 | 2251.4 | 2284.9 | 2319.9 | 2359.2 | 2391.2 | 2410.8 | 2412.3 |
| 12.5° | 2325.0  | 2306.8 | 2293.7 | 2306.0 | 2344.6 | 2385.4 | 2421.8 | 2456.0 | 2485.1 | 2504.7 | 2504.7 |
| 15°   | 2402.1  | 2389.0 | 2373.7 | 2402.1 | 2454.5 | 2490.9 | 2506.2 | 2522.9 | 2539.0 | 2553.5 | 2550.6 |
| 17.5° | 2476.4  | 2464.0 | 2456.0 | 2489.5 | 2544.1 | 2560.8 | 2550.6 | 2538.2 | 2538.2 | 2546.2 | 2547.7 |
| 20°   | 2540.4  | 2529.5 | 2534.6 | 2567.3 | 2595.7 | 2578.3 | 2540.4 | 2501.1 | 2485.1 | 2489.5 | 2493.8 |
| 22.5° | 2596.5  | 2591.4 | 2606.7 | 2621.9 | 2601.6 | 2540.4 | 2470.5 | 2417.4 | 2397.7 | 2396.3 | 2397.7 |
| 25°   | 2662.0  | 2661.2 | 2680.2 | 2652.5 | 2562.3 | 2449.4 | 2355.5 | 2303.8 | 2292.9 | 2301.7 | 2316.2 |
| 27.5° | 2743.5  | 2751.5 | 2761.0 | 2659.8 | 2482.2 | 2311.9 | 2216.5 | 2180.8 | 2191.7 | 2212.9 | 2226.7 |
| 30°   | 2847.6  | 2869.4 | 2849.1 | 2641.6 | 2367.2 | 2154.6 | 2063.6 | 2053.4 | 2083.3 | 2113.1 | 2127.7 |
| 32.5° | 2948.8  | 2983.0 | 2933.5 | 2594.3 | 2218.7 | 1987.9 | 1917.3 | 1914.4 | 1950.8 | 1979.9 | 2000.3 |
| 35°   | 3030.3  | 3098.0 | 2996.8 | 2500.4 | 2046.9 | 1834.3 | 1782.7 | 1763.0 | 1776.1 | 1810.3 | 1833.6 |
| 37.5° | 3136.6  | 3249.4 | 3040.5 | 2357.0 | 1860.5 | 1707.7 | 1647.3 | 1602.1 | 1590.5 | 1604.3 | 1616.0 |
| 40°   | 3330.9  | 3480.2 | 3060.9 | 2156.8 | 1678.6 | 1581.0 | 1519.9 | 1453.6 | 1407.8 | 1374.3 | 1375.0 |
| 42.5° | 3648.3  | 3780.8 | 3047.8 | 1913.7 | 1510.4 | 1457.3 | 1388.1 | 1311.7 | 1237.5 | 1161.7 | 1155.9 |
| 45°   | 4163.7  | 4227.7 | 3008.5 | 1656.0 | 1362.7 | 1327.7 | 1262.9 | 1186.5 | 1087.5 | 1001.6 | 993.6  |
| 47.5° | 4988.4  | 4846.4 | 2947.3 | 1431.1 | 1232.4 | 1217.8 | 1158.1 | 1070.0 | 965.2  | 896.1  | 890.2  |
| 50°   | 6113.0  | 5739.6 | 2917.5 | 1252.0 | 1117.3 | 1121.7 | 1072.9 | 979.8  | 880.8  | 829.8  | 824.0  |
| 52.5° | 7458.2  | 6779.8 | 2975.0 | 1113.7 | 1024.9 | 1040.2 | 1003.8 | 916.4  | 833.5  | 793.4  | 787.6  |
| 55°   | 8853.6  | 7857.1 | 3036.9 | 1013.3 | 937.6  | 967.4  | 955.0  | 883.0  | 808.0  | 770.9  | 765.8  |
| 57.5° | 10048.1 | 8661.4 | 2913.1 | 931.7  | 859.7  | 906.3  | 917.2  | 861.8  | 794.9  | 761.4  | 755.6  |
| 60°   | 10800.0 | 8985.4 | 2588.5 | 855.3  | 797.8  | 857.5  | 895.3  | 856.0  | 800.0  | 797.1  | 792.7  |
| 62.5° | 11156.7 | 8957.0 | 2101.5 | 794.9  | 759.2  | 836.4  | 911.3  | 888.8  | 858.2  | 884.4  | 886.6  |
| 65°   | 10996.6 | 8529.0 | 1565.0 | 754.8  | 731.6  | 844.4  | 959.4  | 950.7  | 875.0  | 901.2  | 904.8  |
| 67.5° | 9942.6  | 7507.7 | 1158.8 | 719.9  | 701.0  | 866.9  | 1046.7 | 971.0  | 842.2  | 861.1  | 849.5  |
| 70°   | 8036.2  | 5952.1 | 893.9  | 680.6  | 669.7  | 864.0  | 1086.0 | 958.7  | 806.5  | 810.9  | 779.6  |
| 72.5° | 5541.6  | 4058.8 | 727.2  | 644.2  | 624.5  | 787.6  | 1058.4 | 928.1  | 776.7  | 743.2  | 701.7  |
| 75°   | 3013.6  | 2178.6 | 618.0  | 606.4  | 545.2  | 691.5  | 1007.4 | 906.3  | 749.8  | 705.3  | 682.1  |
| 77.5° | 1185.8  | 904.1  | 536.5  | 554.7  | 476.8  | 610.7  | 950.7  | 864.8  | 712.6  | 654.4  | 642.7  |
| 80°   | 484.1   | 461.5  | 444.8  | 479.7  | 409.8  | 534.3  | 882.2  | 816.0  | 668.2  | 607.1  | 583.8  |
| 82.5° | 274.4   | 286.8  | 345.8  | 378.5  | 332.7  | 492.1  | 849.5  | 776.7  | 615.1  | 543.8  | 516.1  |
| 85°   | 140.5   | 168.1  | 240.9  | 271.5  | 244.6  | 418.5  | 782.5  | 679.9  | 493.5  | 416.4  | 418.5  |
| 87.5° | 67.7    | 93.9   | 152.1  | 170.3  | 158.7  | 302.8  | 584.5  | 492.8  | 384.3  | 304.3  | 294.8  |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-9-R4

Test Date: 10/23/2019

Luminaire Tested: SA1C-760-U-5WQ

Data in this report applies to families of products SA1C-760-U-5WQ .

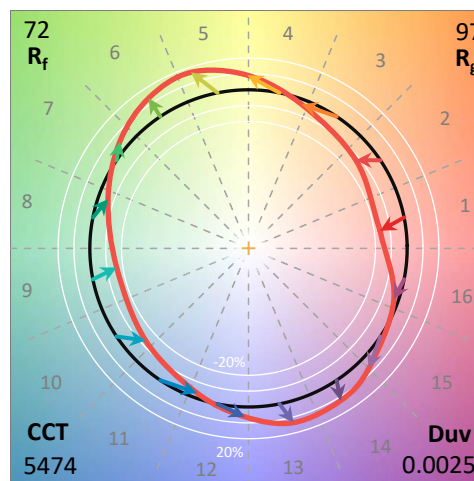
### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-9-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-760-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 5474   | CRI (Ra): | 71.7 |      |       |
| CIE u':                   | 0.2052 | R1:       | 70.6 | R9:  | -27.1 |
| CIE v':                   | 0.4804 | R2:       | 74.6 | R10: | 40.8  |
| Duv:                      | 0.0025 | R3:       | 78.3 | R11: | 74.6  |
| CIE x:                    | 0.3330 | R4:       | 73.8 | R12: | 50.4  |
| CIE y:                    | 0.3466 | R5:       | 72.4 | R13: | 70.0  |
| CIE z:                    | 0.3204 | R6:       | 67.5 | R14: | 87.8  |
| Peak Wavelength (nm):     | 442    | R7:       | 77.5 |      |       |
| Dominant Wavelength (nm): | 554    | R8:       | 58.9 |      |       |
| Purity:                   | 4.1    |           |      |      |       |
| Rf:                       | 72.1   |           |      |      |       |
| Rg:                       | 97.2   |           |      |      |       |



### Test Conditions

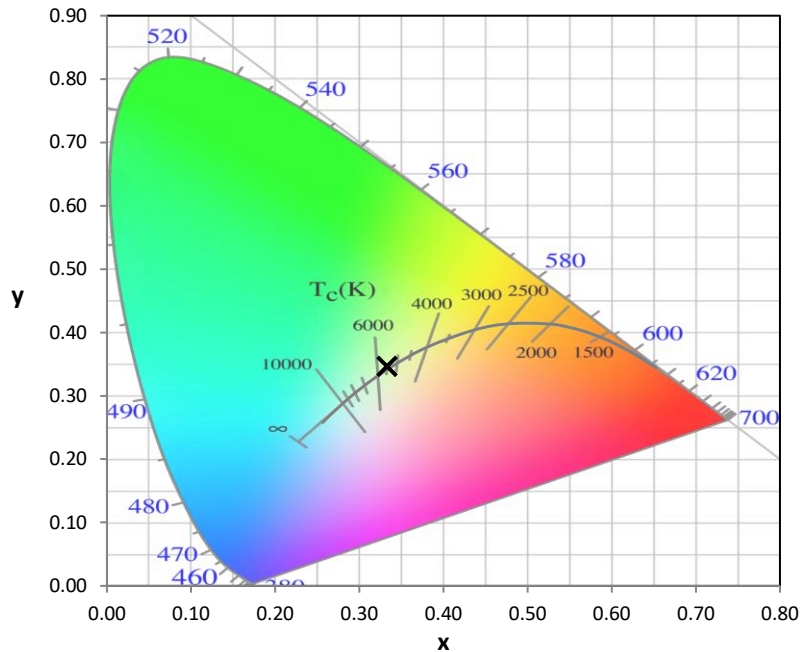
Stabilization Time: 240M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.6/31%  
 Sphere Temperature (°C): 25.9

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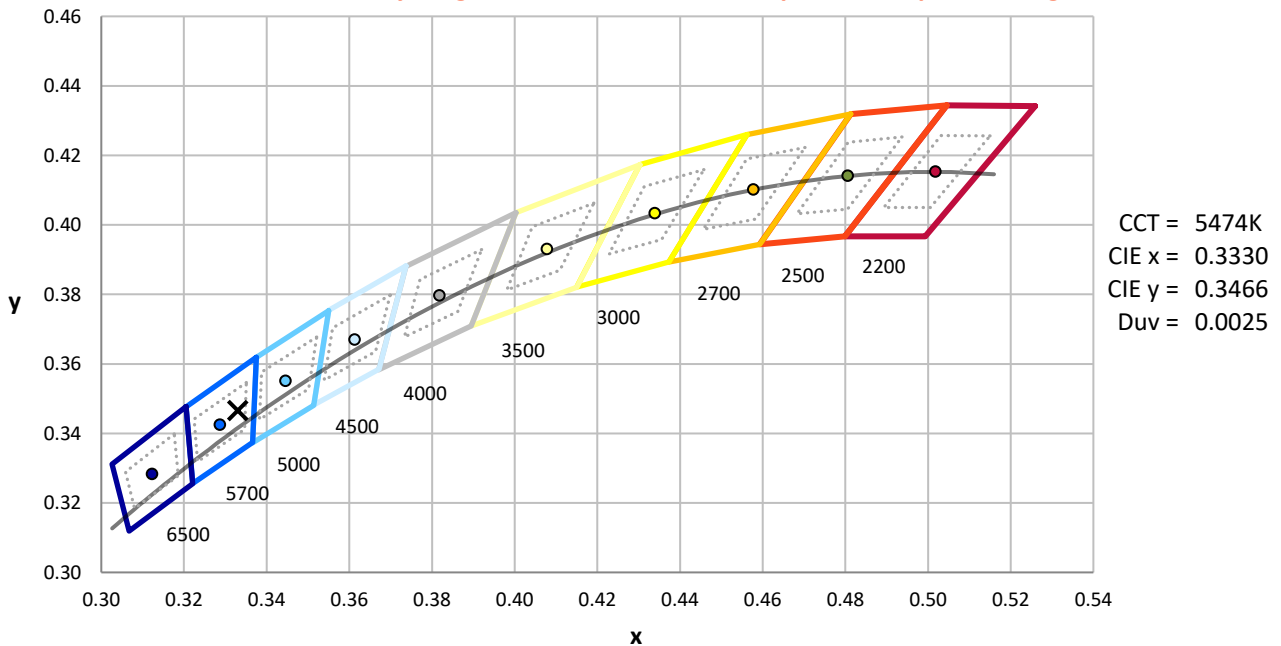
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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**CIE 1931 Chromaticity Diagram**



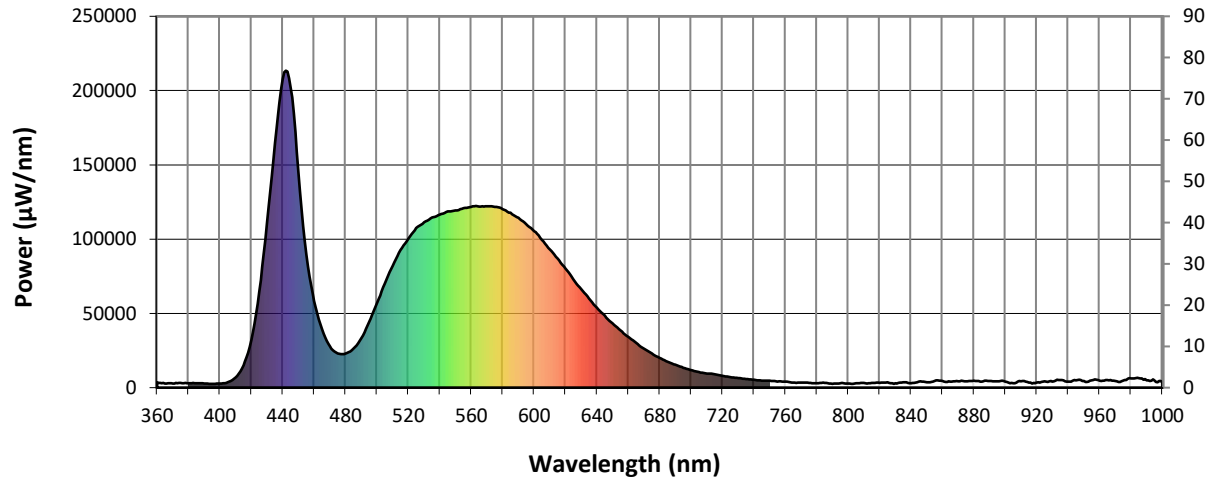
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 5700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

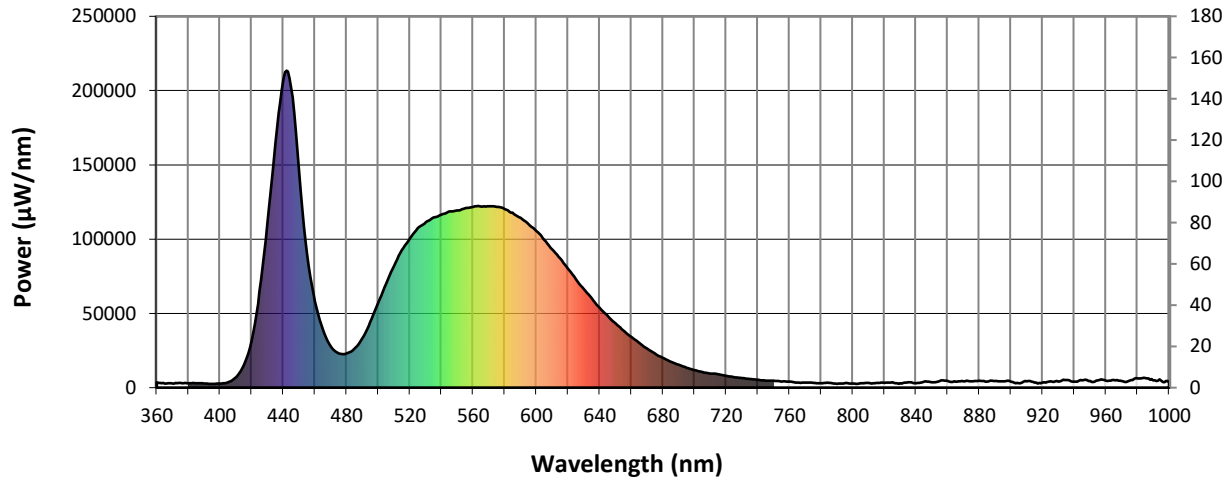


#####

| 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       | 3540             | NR               | 490       | 33363            | NR               | 620       | 80193            | NR               | 750       | 4663             | NR               | 880       | 4678             | NR               |
| 365       | 2862             | NR               | 495       | 44177            | NR               | 625       | 73091            | NR               | 755       | 4147             | NR               | 885       | 4128             | NR               |
| 370       | 2865             | NR               | 500       | 57019            | NR               | 630       | 66269            | NR               | 760       | 4040             | NR               | 890       | 4504             | NR               |
| 375       | 3254             | NR               | 505       | 70030            | NR               | 635       | 60012            | NR               | 765       | 3474             | NR               | 895       | 4371             | NR               |
| 380       | 3076             | NR               | 510       | 81972            | NR               | 640       | 53914            | NR               | 770       | 3469             | NR               | 900       | 4082             | NR               |
| 385       | 2904             | NR               | 515       | 92590            | NR               | 645       | 48385            | NR               | 775       | 3181             | NR               | 905       | 2982             | NR               |
| 390       | 2689             | NR               | 520       | 100305           | NR               | 650       | 43219            | NR               | 780       | 2969             | NR               | 910       | 4351             | NR               |
| 395       | 2619             | NR               | 525       | 107452           | NR               | 655       | 38562            | NR               | 785       | 3132             | NR               | 915       | 3365             | NR               |
| 400       | 2679             | NR               | 530       | 111373           | NR               | 660       | 34110            | NR               | 790       | 2507             | NR               | 920       | 3430             | NR               |
| 405       | 3515             | NR               | 535       | 114505           | NR               | 665       | 30085            | NR               | 795       | 2968             | NR               | 925       | 4264             | NR               |
| 410       | 6934             | NR               | 540       | 116408           | NR               | 670       | 26205            | NR               | 800       | 2758             | NR               | 930       | 4095             | NR               |
| 415       | 14943            | NR               | 545       | 118700           | NR               | 675       | 22906            | NR               | 805       | 2872             | NR               | 935       | 5048             | NR               |
| 420       | 31939            | NR               | 550       | 119209           | NR               | 680       | 20058            | NR               | 810       | 3094             | NR               | 940       | 4074             | NR               |
| 425       | 64701            | NR               | 555       | 120742           | NR               | 685       | 17413            | NR               | 815       | 3222             | NR               | 945       | 4949             | NR               |
| 430       | 110939           | NR               | 560       | 121594           | NR               | 690       | 15447            | NR               | 820       | 3238             | NR               | 950       | 4387             | NR               |
| 435       | 164597           | NR               | 565       | 121913           | NR               | 695       | 13398            | NR               | 825       | 3524             | NR               | 955       | 4978             | NR               |
| 440       | 207696           | NR               | 570       | 122147           | NR               | 700       | 11777            | NR               | 830       | 2921             | NR               | 960       | 4706             | NR               |
| 445       | 201830           | NR               | 575       | 121605           | NR               | 705       | 10412            | NR               | 835       | 3595             | NR               | 965       | 5083             | NR               |
| 450       | 145410           | NR               | 580       | 120248           | NR               | 710       | 9544             | NR               | 840       | 3016             | NR               | 970       | 4522             | NR               |
| 455       | 89594            | NR               | 585       | 117717           | NR               | 715       | 8940             | NR               | 845       | 4032             | NR               | 975       | 4740             | NR               |
| 460       | 58321            | NR               | 590       | 114359           | NR               | 720       | 7897             | NR               | 850       | 3579             | NR               | 980       | 6122             | NR               |
| 465       | 39318            | NR               | 595       | 109974           | NR               | 725       | 7045             | NR               | 855       | 4571             | NR               | 985       | 6450             | NR               |
| 470       | 27693            | NR               | 600       | 105269           | NR               | 730       | 6483             | NR               | 860       | 4485             | NR               | 990       | 4875             | NR               |
| 475       | 23081            | NR               | 605       | 99453            | NR               | 735       | 5838             | NR               | 865       | 3978             | NR               | 995       | 4764             | NR               |
| 480       | 23002            | NR               | 610       | 92921            | NR               | 740       | 5261             | NR               | 870       | 4298             | NR               | 1000      | 3640             | NR               |
| 485       | 26201            | NR               | 615       | 86989            | NR               | 745       | 4760             | NR               | 875       | 4356             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



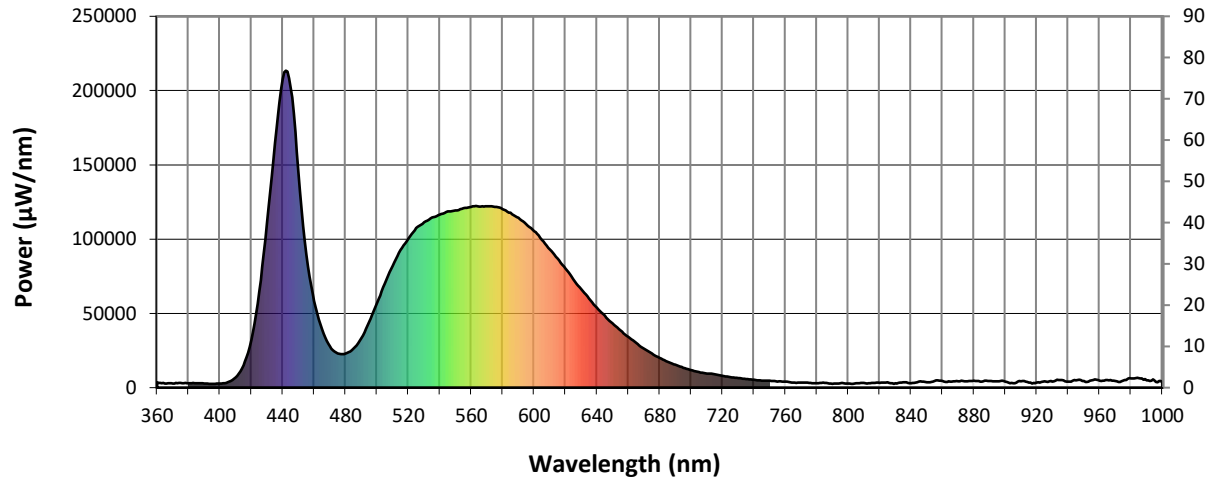
Scotopic Lumens: 13759.3

S/P: 1.85

| 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       | 3540             | NR               | 490       | 33363            | NR               | 620       | 80193            | NR               | 750       | 4663             | NR               | 880       | 4678             | NR               |
| 365       | 2862             | NR               | 495       | 44177            | NR               | 625       | 73091            | NR               | 755       | 4147             | NR               | 885       | 4128             | NR               |
| 370       | 2865             | NR               | 500       | 57019            | NR               | 630       | 66269            | NR               | 760       | 4040             | NR               | 890       | 4504             | NR               |
| 375       | 3254             | NR               | 505       | 70030            | NR               | 635       | 60012            | NR               | 765       | 3474             | NR               | 895       | 4371             | NR               |
| 380       | 3076             | NR               | 510       | 81972            | NR               | 640       | 53914            | NR               | 770       | 3469             | NR               | 900       | 4082             | NR               |
| 385       | 2904             | NR               | 515       | 92590            | NR               | 645       | 48385            | NR               | 775       | 3181             | NR               | 905       | 2982             | NR               |
| 390       | 2689             | NR               | 520       | 100305           | NR               | 650       | 43219            | NR               | 780       | 2969             | NR               | 910       | 4351             | NR               |
| 395       | 2619             | NR               | 525       | 107452           | NR               | 655       | 38562            | NR               | 785       | 3132             | NR               | 915       | 3365             | NR               |
| 400       | 2679             | NR               | 530       | 111373           | NR               | 660       | 34110            | NR               | 790       | 2507             | NR               | 920       | 3430             | NR               |
| 405       | 3515             | NR               | 535       | 114505           | NR               | 665       | 30085            | NR               | 795       | 2968             | NR               | 925       | 4264             | NR               |
| 410       | 6934             | NR               | 540       | 116408           | NR               | 670       | 26205            | NR               | 800       | 2758             | NR               | 930       | 4095             | NR               |
| 415       | 14943            | NR               | 545       | 118700           | NR               | 675       | 22906            | NR               | 805       | 2872             | NR               | 935       | 5048             | NR               |
| 420       | 31939            | NR               | 550       | 119209           | NR               | 680       | 20058            | NR               | 810       | 3094             | NR               | 940       | 4074             | NR               |
| 425       | 64701            | NR               | 555       | 120742           | NR               | 685       | 17413            | NR               | 815       | 3222             | NR               | 945       | 4949             | NR               |
| 430       | 110939           | NR               | 560       | 121594           | NR               | 690       | 15447            | NR               | 820       | 3238             | NR               | 950       | 4387             | NR               |
| 435       | 164597           | NR               | 565       | 121913           | NR               | 695       | 13398            | NR               | 825       | 3524             | NR               | 955       | 4978             | NR               |
| 440       | 207696           | NR               | 570       | 122147           | NR               | 700       | 11777            | NR               | 830       | 2921             | NR               | 960       | 4706             | NR               |
| 445       | 201830           | NR               | 575       | 121605           | NR               | 705       | 10412            | NR               | 835       | 3595             | NR               | 965       | 5083             | NR               |
| 450       | 145410           | NR               | 580       | 120248           | NR               | 710       | 9544             | NR               | 840       | 3016             | NR               | 970       | 4522             | NR               |
| 455       | 89594            | NR               | 585       | 117717           | NR               | 715       | 8940             | NR               | 845       | 4032             | NR               | 975       | 4740             | NR               |
| 460       | 58321            | NR               | 590       | 114359           | NR               | 720       | 7897             | NR               | 850       | 3579             | NR               | 980       | 6122             | NR               |
| 465       | 39318            | NR               | 595       | 109974           | NR               | 725       | 7045             | NR               | 855       | 4571             | NR               | 985       | 6450             | NR               |
| 470       | 27693            | NR               | 600       | 105269           | NR               | 730       | 6483             | NR               | 860       | 4485             | NR               | 990       | 4875             | NR               |
| 475       | 23081            | NR               | 605       | 99453            | NR               | 735       | 5838             | NR               | 865       | 3978             | NR               | 995       | 4764             | NR               |
| 480       | 23002            | NR               | 610       | 92921            | NR               | 740       | 5261             | NR               | 870       | 4298             | NR               | 1000      | 3640             | NR               |
| 485       | 26201            | NR               | 615       | 86989            | NR               | 745       | 4760             | NR               | 875       | 4356             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5527.6 M/P: 0.74**

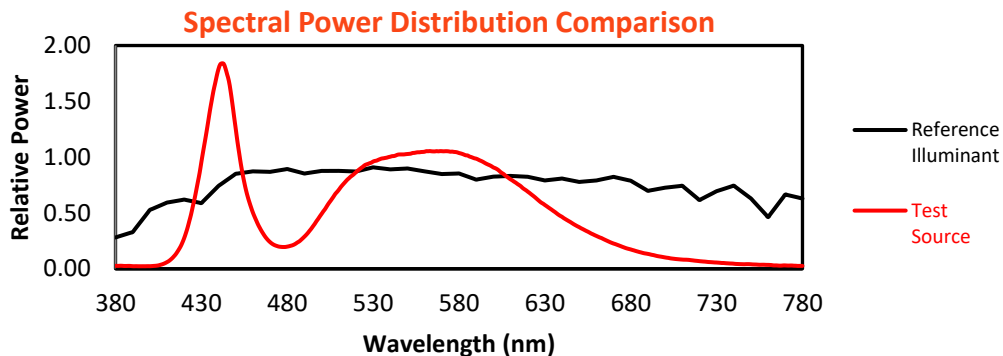
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 3540             | NR               | 490       | 33363            | NR               | 620       | 80193            | NR               | 750       | 4663             | NR               | 880       | 4678             | NR               |
| 365       | 2862             | NR               | 495       | 44177            | NR               | 625       | 73091            | NR               | 755       | 4147             | NR               | 885       | 4128             | NR               |
| 370       | 2865             | NR               | 500       | 57019            | NR               | 630       | 66269            | NR               | 760       | 4040             | NR               | 890       | 4504             | NR               |
| 375       | 3254             | NR               | 505       | 70030            | NR               | 635       | 60012            | NR               | 765       | 3474             | NR               | 895       | 4371             | NR               |
| 380       | 3076             | NR               | 510       | 81972            | NR               | 640       | 53914            | NR               | 770       | 3469             | NR               | 900       | 4082             | NR               |
| 385       | 2904             | NR               | 515       | 92590            | NR               | 645       | 48385            | NR               | 775       | 3181             | NR               | 905       | 2982             | NR               |
| 390       | 2689             | NR               | 520       | 100305           | NR               | 650       | 43219            | NR               | 780       | 2969             | NR               | 910       | 4351             | NR               |
| 395       | 2619             | NR               | 525       | 107452           | NR               | 655       | 38562            | NR               | 785       | 3132             | NR               | 915       | 3365             | NR               |
| 400       | 2679             | NR               | 530       | 111373           | NR               | 660       | 34110            | NR               | 790       | 2507             | NR               | 920       | 3430             | NR               |
| 405       | 3515             | NR               | 535       | 114505           | NR               | 665       | 30085            | NR               | 795       | 2968             | NR               | 925       | 4264             | NR               |
| 410       | 6934             | NR               | 540       | 116408           | NR               | 670       | 26205            | NR               | 800       | 2758             | NR               | 930       | 4095             | NR               |
| 415       | 14943            | NR               | 545       | 118700           | NR               | 675       | 22906            | NR               | 805       | 2872             | NR               | 935       | 5048             | NR               |
| 420       | 31939            | NR               | 550       | 119209           | NR               | 680       | 20058            | NR               | 810       | 3094             | NR               | 940       | 4074             | NR               |
| 425       | 64701            | NR               | 555       | 120742           | NR               | 685       | 17413            | NR               | 815       | 3222             | NR               | 945       | 4949             | NR               |
| 430       | 110939           | NR               | 560       | 121594           | NR               | 690       | 15447            | NR               | 820       | 3238             | NR               | 950       | 4387             | NR               |
| 435       | 164597           | NR               | 565       | 121913           | NR               | 695       | 13398            | NR               | 825       | 3524             | NR               | 955       | 4978             | NR               |
| 440       | 207696           | NR               | 570       | 122147           | NR               | 700       | 11777            | NR               | 830       | 2921             | NR               | 960       | 4706             | NR               |
| 445       | 201830           | NR               | 575       | 121605           | NR               | 705       | 10412            | NR               | 835       | 3595             | NR               | 965       | 5083             | NR               |
| 450       | 145410           | NR               | 580       | 120248           | NR               | 710       | 9544             | NR               | 840       | 3016             | NR               | 970       | 4522             | NR               |
| 455       | 89594            | NR               | 585       | 117717           | NR               | 715       | 8940             | NR               | 845       | 4032             | NR               | 975       | 4740             | NR               |
| 460       | 58321            | NR               | 590       | 114359           | NR               | 720       | 7897             | NR               | 850       | 3579             | NR               | 980       | 6122             | NR               |
| 465       | 39318            | NR               | 595       | 109974           | NR               | 725       | 7045             | NR               | 855       | 4571             | NR               | 985       | 6450             | NR               |
| 470       | 27693            | NR               | 600       | 105269           | NR               | 730       | 6483             | NR               | 860       | 4485             | NR               | 990       | 4875             | NR               |
| 475       | 23081            | NR               | 605       | 99453            | NR               | 735       | 5838             | NR               | 865       | 3978             | NR               | 995       | 4764             | NR               |
| 480       | 23002            | NR               | 610       | 92921            | NR               | 740       | 5261             | NR               | 870       | 4298             | NR               | 1000      | 3640             | NR               |
| 485       | 26201            | NR               | 615       | 86989            | NR               | 745       | 4760             | NR               | 875       | 4356             | NR               |           |                  |                  |

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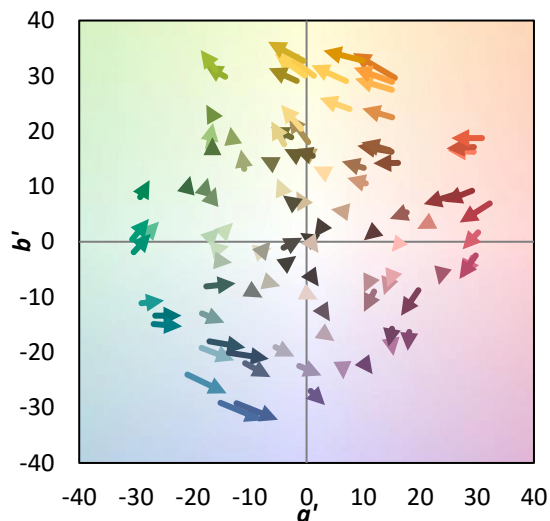
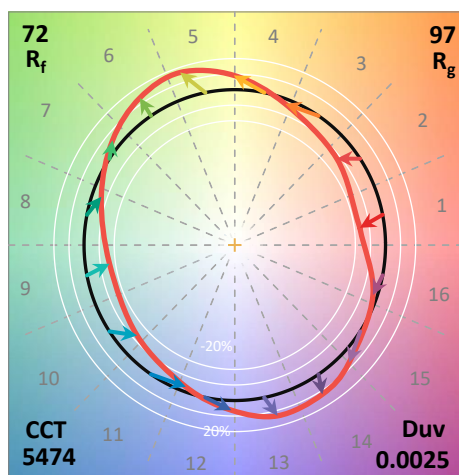
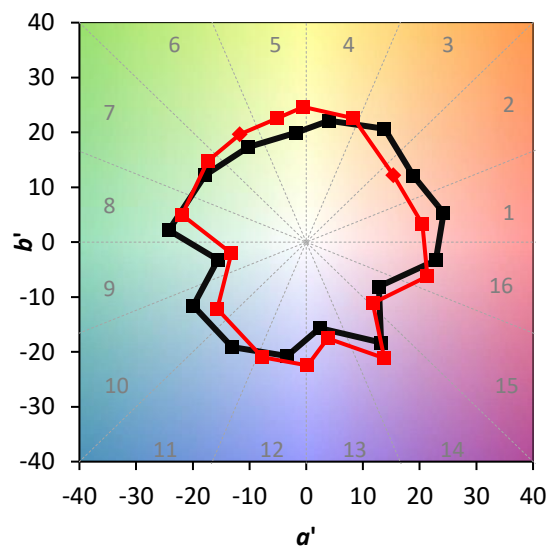
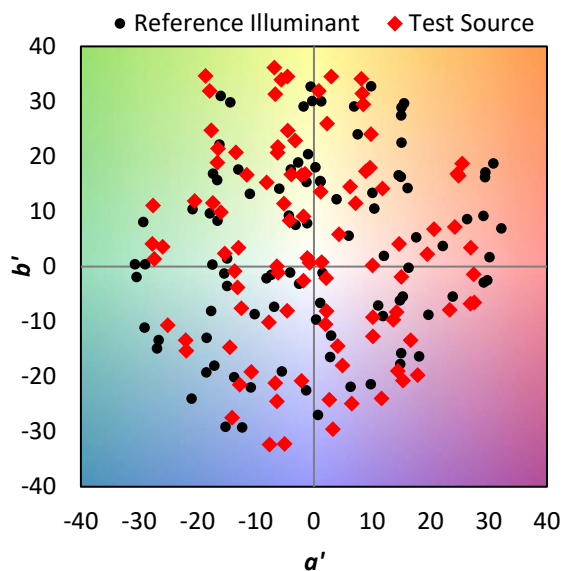
**TM-30-18**

**Summary**

$R_f = 72.1$   
 $R_g = 97.2$   
 CIE  $R_a = 71.7$   
 $R_g = -27.1$



**Color Vector Graphics**



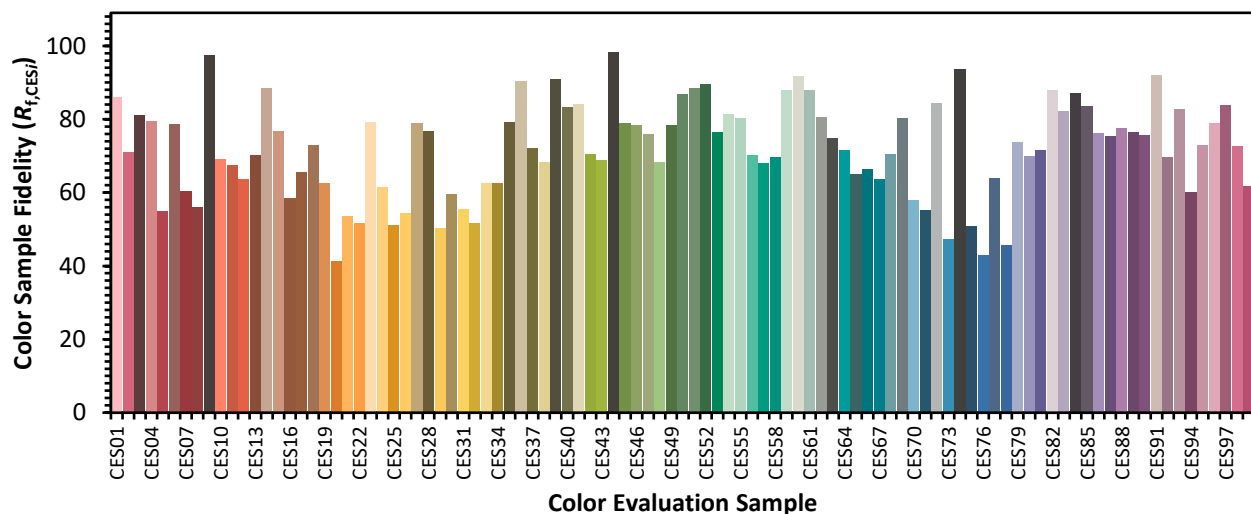


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

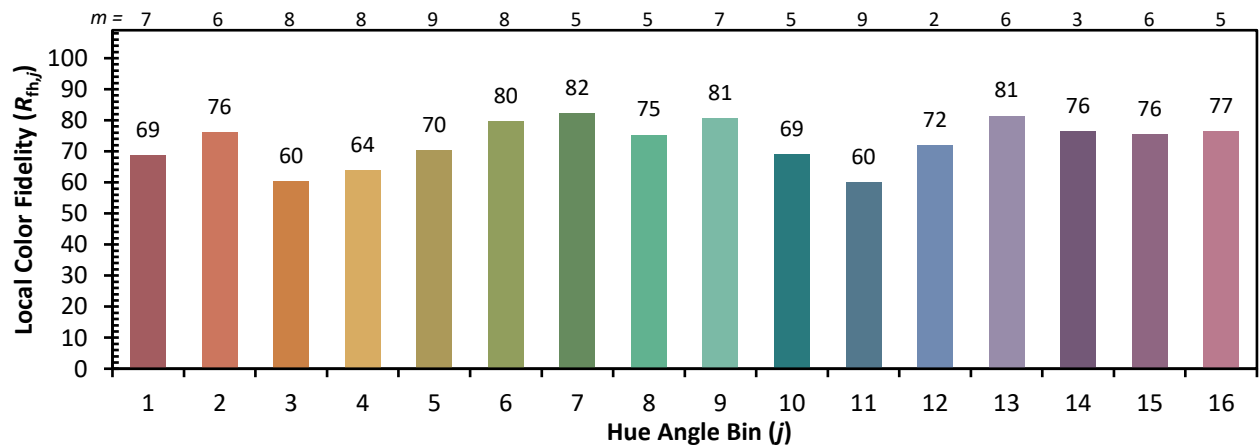
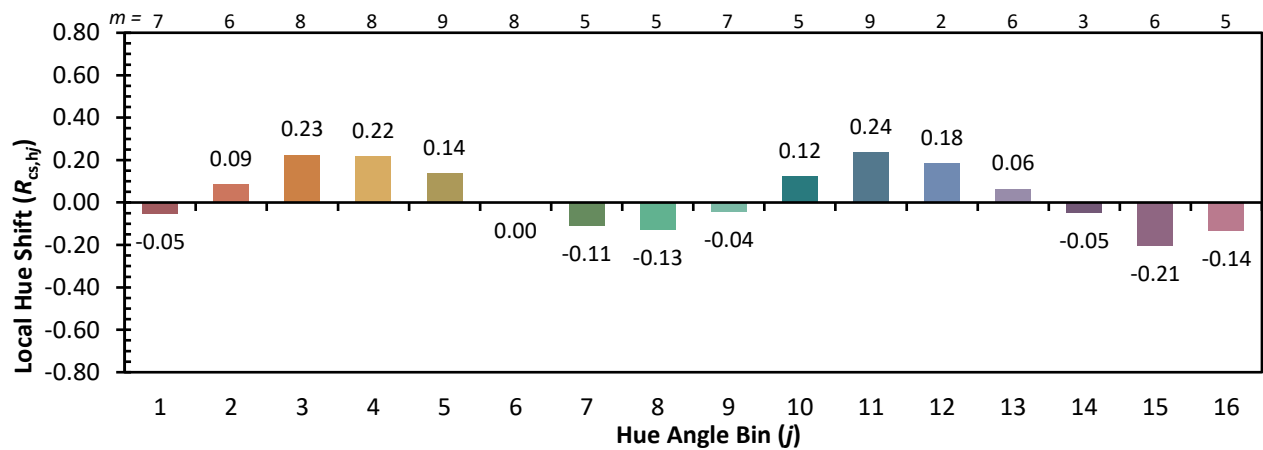
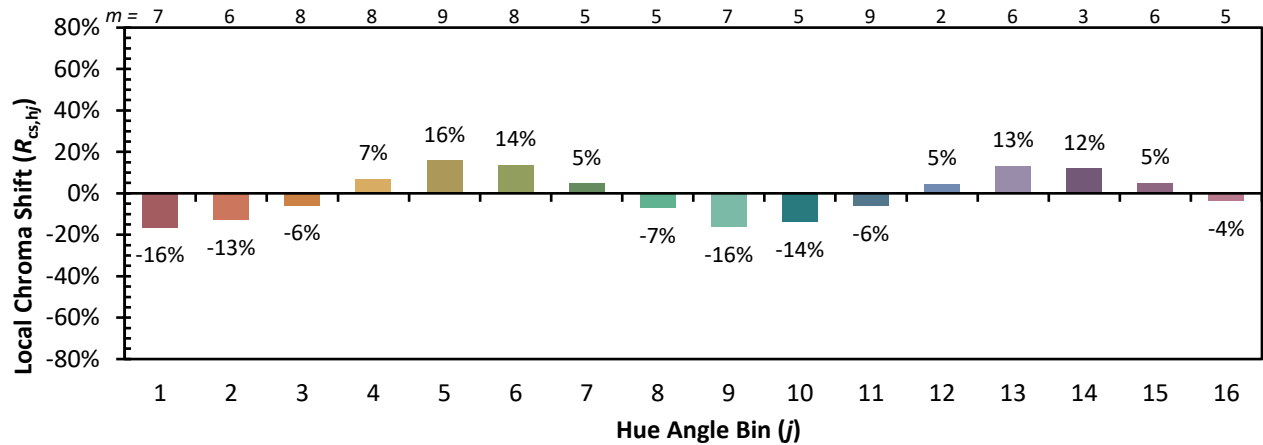
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 54 | CES51 = 88 | CES76 = 43 |
| CES02 = 59 | CES27 = 79 | CES52 = 90 | CES77 = 64 |
| CES03 = 30 | CES28 = 77 | CES53 = 77 | CES78 = 46 |
| CES04 = 69 | CES29 = 50 | CES54 = 81 | CES79 = 74 |
| CES05 = 46 | CES30 = 59 | CES55 = 80 | CES80 = 70 |
| CES06 = 50 | CES31 = 55 | CES56 = 70 | CES81 = 71 |
| CES07 = 38 | CES32 = 52 | CES57 = 68 | CES82 = 88 |
| CES08 = 38 | CES33 = 63 | CES58 = 70 | CES83 = 82 |
| CES09 = 29 | CES34 = 63 | CES59 = 88 | CES84 = 87 |
| CES10 = 72 | CES35 = 79 | CES60 = 92 | CES85 = 84 |
| CES11 = 55 | CES36 = 90 | CES61 = 88 | CES86 = 76 |
| CES12 = 61 | CES37 = 72 | CES62 = 81 | CES87 = 75 |
| CES13 = 41 | CES38 = 68 | CES63 = 75 | CES88 = 77 |
| CES14 = 74 | CES39 = 91 | CES64 = 72 | CES89 = 76 |
| CES15 = 70 | CES40 = 83 | CES65 = 65 | CES90 = 76 |
| CES16 = 46 | CES41 = 84 | CES66 = 66 | CES91 = 92 |
| CES17 = 48 | CES42 = 70 | CES67 = 64 | CES92 = 70 |
| CES18 = 55 | CES43 = 69 | CES68 = 71 | CES93 = 83 |
| CES19 = 70 | CES44 = 98 | CES69 = 80 | CES94 = 60 |
| CES20 = 64 | CES45 = 79 | CES70 = 58 | CES95 = 73 |
| CES21 = 85 | CES46 = 78 | CES71 = 55 | CES96 = 79 |
| CES22 = 77 | CES47 = 76 | CES72 = 84 | CES97 = 84 |
| CES23 = 91 | CES48 = 68 | CES73 = 47 | CES98 = 73 |
| CES24 = 90 | CES49 = 78 | CES74 = 94 | CES99 = 62 |
| CES25 = 71 | CES50 = 87 | CES75 = 51 |            |



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**TM-30-18**

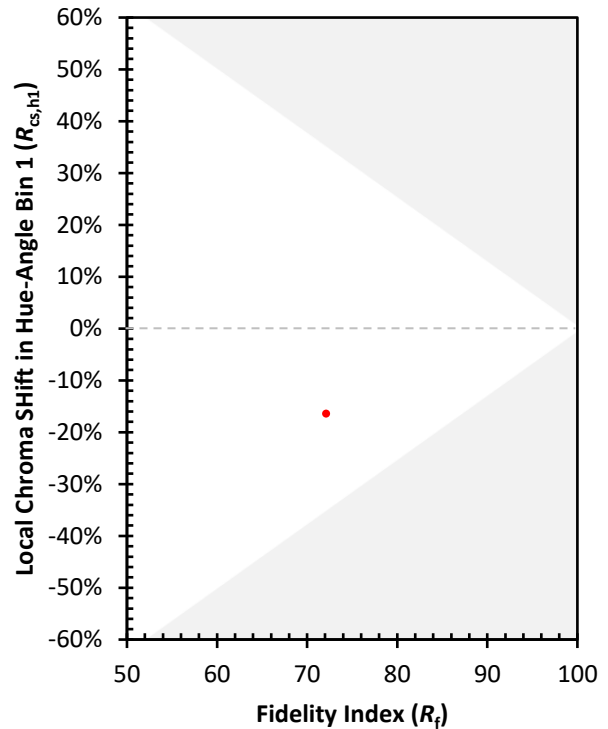
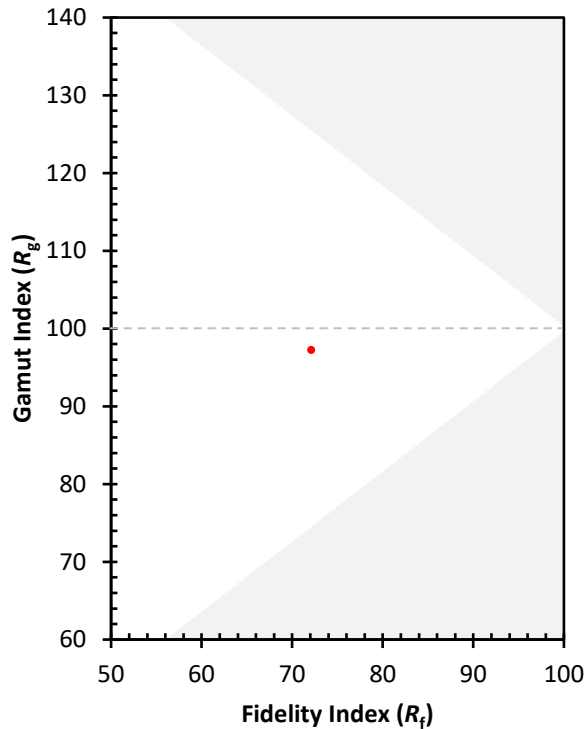
**Color Rendition by Hue-Angle Bin**



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)